Impact of Interlocutor and Task on Second-grade One-way Chinese Immersion Students' Language Use

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Dedication

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Abstract

This case study explores patterns of first language (L1) and second language (L2) use by three second graders attending an early total one-way Chinese immersion program in the U.S. as they carried out classroom tasks and activities with different interlocutors in the classroom. Their naturally occurring verbal interactions in the classroom were audio-recorded all day long for six near-consecutive days. Data were transcribed and analyzed quantitatively and qualitatively. Quantitatively, Rbrul was used to model each of the three children's choice between Chinese and English to identify which contextual factor(s) consistently contributed to their choices. Qualitative analysis was then performed to provide contextual information for their verbal interactions that cannot be captured by the quantitative results, and to explore possible explanations for the quantitative patterns.

Findings show that the three children differed from one another considerably in their overall use of Chinese: one child almost always spoke Chinese, and the other two children used more English, depending on contextual variables. The contextual factor that most affected all three children's use of either Chinese or English was their interlocutor. The teacher, researcher, and particular student (Filip) as interlocutors strongly promoted the children's use of Chinese; other students as interlocutors variably promoted their use of English. The different social roles that each of the three children played in the classroom also seemed to relate to their use or non-use of Chinese. A leadership role that involved a child's identification with the teacher appeared to promote that child's L2 use, while another child's resistance to the teacher's authority tended to promote that child's L1 use. Peer leaders, either emulating or resisting the teacher, appeared to exert strong

impact on language behavior of other children who played the role of follower. Such followers tended to accommodate to the language preferences of peer leaders moment to moment in oral interaction.

Other contextual factors also affected the three children's language use. Academic contexts overall promoted their use of Chinese while non-academic contexts promoted English. Within academic contexts, the content areas of Chinese language arts and math promoted Chinese and the content areas of science and health, while less well represented in the data base, seemed to promote English and Chinese respectively. Teacher-fronted activities promoted Chinese for all three students, while writing activities and interactive activities impacted different children's language use differently. When the children were on-task, they spoke significantly more Chinese than in off-task situations.

Theoretical and pedagogical implications of these findings are explored. In particular, the social role a child plays is an important and useful construct to understand language use in immersion classrooms. These findings suggest that when teachers assign children to small groups, they need to pay attention to the roles that the children are playing and try to strategically alter group membership to maximize the children's use of the immersion language. Pedagogically, the findings support the use of inductive teaching approaches, rather than just lecturing, to promote children's use of the immersion language.

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Chapter 1

Introduction: Language Use in the Immersion Classroom

It has been widely acknowledged that language immersion is one of the most successful models for children to learn a second language in school in the United States and in Canada. A prototypical foreign language immersion program, according to Swain and Johnson (1997), is one that

> uses the L2 as medium of instruction although students have little or no L2 proficiency on entry to immersion. The academic curriculum of the "home" education system determines the content, and the classroom culture is that of the local L1 community. The learning context is one where exposure to the L2 is largely confined to the classroom. Teachers are bilingual in the students' L1 and the target L2. The target bilingual proficiency of the students is "additive," with normal L1 development a requirement, and a high level of L2 proficiency expected. L2 proficiency, however, is not fully equivalent to the proficiency of a native speaker either in its grammatical features or in its functional range. (p. 15)

Swain and Johnson's (1997) last statement suggests that although immersion students appear to achieve a level of functional proficiency in the target language, there are clear gaps in their second language skills. Research has shown that immersion learners can produce forms that deviate lexically, syntactically, and pragmatically from native-speaker norms even after receiving many years of comprehensible input (Swain, 1985). For example, Swain (1985) and Harley, Cummins, Swain, and Allen (1990) compared Canadian French immersion students' grammar, discourse, and sociolinguistic traits with those of native speakers of French of the same age (i.e., 11-12 years old). Their findings suggest that while immersion students performed at native levels on measures of discourse competence, they did not demonstrate native-like proficiency in the grammar domain, especially on verbs. The immersion students also performed significantly differently on sociolinguistic measures compared with their native-speaking peers. For

instance, immersion students were found to use considerably fewer singular *vous* and conditional verb forms to show politeness (Harley et al., 1990). Whereas immersion students performed equally to their native-speaking peers in cases where formulaic politeness terms were possible, their performance was clearly inferior to that of native speakers, especially when grammatical knowledge inevitably played an important role in the production of forms that were sociolinguistically appropriate (Swain, 1985).

Research findings on immersion students' interlanguage[1] (e.g., Swain, 1985; Harley et al., 1990) suggest that rich immersion classroom exposure to comprehensible input in the target language (Krashen, 1985) cannot result in native-like performance for immersion students' target language learning outcomes (Swain, 1985). Swain (1985) suggests that "immersion students do not demonstrate native-speaker productive competence, *not* because their comprehensible input is limited but because their comprehensible output is limited" (p. 249). She argues that comprehensible output benefits second language acquisition, because (1) it pushes learners to produce utterances that are precise, coherent and appropriate; (2) it serves as a hypothesis testing function when learners try to say something they are not sure about and receive feedback; and (3) it forces learners to move from top-down semantic processing to bottom-up syntactic processing (Swain, 1985). In the same year, Long (1985) also rejected the adequacy of comprehensible input, focusing on oral interaction and the negotiation of meaning as the driving force in making input comprehensible. The psycholinguistic premise underlying promotion of L2 output and interaction in immersion contexts is that retrieval of target

[1] Interlanguage refers to "the linguistic system of learner language produced by adults when they attempt meaningful communication using a language they are in the process of learning" (Tarone, 2018, p. 1). Selinker, Swain and Dumas (1975) extended the interlanguage hypothesis to immersion children.

language forms and representations and subsequent productions in meaningful contexts increases in-depth processing and enhances automaticity, which makes those linguistic forms and presentations easier to access during spontaneous production later (Lyster, 2007; DeKeyser, 2015).

Given that learner **use** of a language is crucial for second language acquisition and content learning in the immersion context, it is important to know the extent to which the immersion language is used by students in immersion classrooms, and the factors that either promote or hinder the use of the immersion language, especially since students' only exposure to the immersion language is at school. Over the past three decades, studies have been conducted to shed light on students' L1 and L2 use in one-way immersion programs[2]. Research attention was first paid to older immersion children because informal classroom observations and anecdotal hints suggested a marked decrease in the use of the L2 as children progressed through grade levels (Tarone & Swain, 1995). Following Tarone and Swain (1995), a group of systemic studies were carried out to describe the roles of L1 and L2 in one-way immersion classrooms and uncover possible reasons of why these preadolescents did not exclusively use the L2 at school; among these were Cohen (1994), Heitzman (1994), Blanco-Iglesias, Broner, and Tarone (1995), Parker, Heitzman, Fjerstad, Babbs, and Cohen (1995), Swain & Lapkin (1998), Broner (2001). These studies offered empirical support for Tarone and Swain's (1995) hypothesis that older children might not always use the immersion language in the

[2] A typical one-way immersion program serves students who has little or no proficiency of immersion language on entry to the program. A two-way immersion program is designed to "serve both English and non-English speakers. The latter group will usually make up 25 to 50 percent of the student body. Children from each language group are mixed in the same classroom" (Brondum & Stenson, 1998).

classroom because they are not exposed to its vernacular variety, so they switch to their L1 vernacular when communicating for preadolescent social purposes. These studies also found factors of interlocutor, task, and cognitive load of academic activities played a crucial role in conditioning preadolescents' choice between L1 and L2 in one-way immersion classrooms.

While it is now fairly clear how much L1 and L2 are used by older immersion students and reasons why they do not always use the immersion language, our understanding of younger immersion learners' use of L1 and L2 and factors that might possibly affect their choice in one-way immersion programs is more limited. Our lack of information is due to a failure to systematically study this issue with rigorous data gathering and analysis techniques (Arnau & Bel, 1995; Wang, 2008; Dorner & Layton, 2014; Bucknam, 2016; Sung & Tsai, 2019). Interestingly, considerable research with methodological rigor has been carried out on younger immersion students' language choices in two-way immersion programs (e.g., Delgado-Larocco, 1998; Olmedo, 2003; Angelova, Gunawardena, & Volk, 2006; Volk & Angelova, 2007; Lee, Hill-Bonnet, & Gillispie, 2008; Palmer, 2009; Ballinger & Lyster, 2011; Gort, 2012; S. Lee, 2014; Hamman, 2018).

The fact that there is relatively very little systematic research documenting younger immersion children's use of the L2 in one-way immersion programs perhaps reflects researchers' and teachers' low expectations about young children's L2 production at this early stage of acquisition. As Barik and Swain (1975) noted in their evaluation of an early grade French immersion program in Canada:

> At the Kindergarten level, the teacher addresses her pupils only in French, although the children continue using English in their spontaneous speech throughout most of the year. The teacher does, however, encourage the children to use more and more French as the year progress. In Grade 1, French continues to be the only language of instruction. […]. They increasingly use French whenever they speak to the teacher and frequently converse among themselves in French. By the end of Grade 1, French is clearly established as the language of the classroom. (p. 3)

This statement suggests that immersion researchers and teachers do not seem to expect younger children to only speak L2 in the classroom in the early stages of their L2 proficiency. The expectation seems to be that it doesn't matter how much L2 they use in the classroom because their language is likely mixed at this stage of acquisition. As long as the teacher stays in the immersion language and makes sure that the children understand what they are saying, over time the children will start to use the immersion language more and more. Barik and Swain (1975) seem to rationalize this lack of research attention paid to younger immersion children's language use in one-way programs, suggesting that if children will get there by using more and more L2 as time goes by, we don't need to bother studying how they get there in the first place.

However, it's important to ask, why NOT? Why wouldn't researchers want to carefully document how children make the transition from being monolingual speakers to starting to use the immersion language? In first language acquisition, children will start slowly but speak more of their mother tongue as time goes by, but our passion for knowing more about how they learn to speak their mother tongue never seems to fade away. Their L1 developmental stages have been carefully documented, providing a valuable baseline for evaluation and diagnosis of language delay and disorder (e.g., Lust, 2006; Guasti, 2016; Schwartz, 2017; Che, Brooks, Alarcon, Yannaco, & Donnelly,

2018). If that is what we do for first language acquisition, then why wouldn't we want to do the same thing for second language acquisition in the context of language immersion programs? Arguably, a good baseline for the earliest stages of the second language acquisition of young learners will be equally important and meaningful for immersion programs and for parents who have good faith in the immersion model and have their children enrolled in language immersion programs.

The present study begins to address this gap. This study aims to add some empirical data at a much earlier level of child second language development in one-way immersion context than is typically the case, by systemically gathering and analyzing data in a second-grade classroom in a one-way Chinese immersion program in the U.S.

It is important to make it very clear that the literature review for this study will purposely omit studies investigating student language use in two-way immersion programs (Delgado-Larocco, 1998; Fortune, 2001; Olmedo, 2003; Potowski, 2004; Angelova, Gunawardena, & Volk, 2006; Volk & Angelova, 2007; Lee, Hill-Bonnet, & Gillispie, 2008; Palmer, 2009; Martin-Beltrán, 2010; Ballinger & Lyster, 2011; Gort, 2012; S. Lee, 2014; Henderson & Palmer, 2015; Hernández, 2015; Young & Tedick, 2016; Ballinger, 2017; Hamman, 2018). This is because the intentional mixing of English monolingual speakers and heritage speakers of the immersion language is likely to introduce many more variables that might possibly affect two-way immersion students' language choice than will be the case in the one-way context. Recurring themes and findings that presumably affect two-way immersion students' choice between L1 and L2 include, for example, dominance of English speaking children in classroom participation and interaction (e.g. Palmer, 2009; Hernández, 2015; Hamman, 2018), reproduction of

social inequality between ethnic groups (e.g. Volk & Angelova, 2007; Palmer, 2009; Palmer, Ballinger, & Peter, 2014; Hernández, 2015), two-way immersion teachers' language practices and separation of the instructional languages (e.g. Lee, Hill-Bonnet, & Gillispie, 2008; Palmer, 2009; Henderson & Palmer, 2015; Hamman, 2018), fluidity of the expert/novice roles between the English group and the Spanish group in early grades (e.g. Olmedo, 2003; Angelova, Gunawardena, & Volk, 2006), and identity construction and investment of heritage speakers (e.g. Potowski, 2004). Some of these studies even question the appropriateness of using labels of L1 and L2 in two-way immersion contexts (e.g., Martin-Beltrán, 2010), because of the different linguistic backgrounds the children come from and the different amount of exposure of the immersion language they receive at home and in the community. Such issues relating to two-way immersion students' language use, in particular with peers, are very unlikely to carry equal explanatory power in one-way immersion programs, which is the context of the present study.

In the following chapters, I will report in detail the language use of three second graders in a one-way Chinese immersion program, exploring their idiosyncratic patterns of language practices and contextual factors that might affect their use or non-use of the immersion language. The findings will uncover individual differences in the 3 children's overall use of Chinese or English, but also identify situational variables related to academic vs. nonacademic context that significantly increase or decrease the Chinese language use of all three. The social roles played by the children at school, and their impact on this variable language use, will be explored.

Chapter 2

Literature Review: Student Language Use and Chinese Interlanguage

This review considers two branches of research. As mentioned in the previous chapter, the review focuses only on relevant studies investigating student language use in one-way immersion programs. The review also includes literature on the unit of analysis that has been used for quantitative analysis of Chinese interlanguage, which will inform the selection of the unit of analysis in this study. The two research questions that the present study aims to address are:

1. In a second-grade one-way early total Chinese immersion classroom, how much English L1 and Chinese L2 are used by focal students with various interlocutors they encounter?
2. In a second-grade one-way early total Chinese immersion classroom, how much English L1 and Chinese L2 are used by focal students while carrying out academic compared to non-academic tasks and activities?

First and Second Language Use in One-way Immersion Classrooms

The earliest investigations about immersion students' L1 and L2 use in North America were motivated by immersion researchers' and teachers' observations of a marked decrease in the use of the L2 as children progressed through grade levels (Tarone & Swain, 1995; Blanco-Iglesias, Broner, & Tarone, 1995). For instance, Tarone and Swain (1995) examined teacher reports and interviews with a Canadian French immersion graduate, and hypothesized that her unwillingness to use the immersion language in the upper elementary grades was partly due to a lack of exposure to an age-appropriate vernacular variety in the L2 which she could use for adolescent social

purposes. Taking a sociolinguistic perspective, the authors note that strong social and functional pressures on the wider speech community creates a need for its members to use different language styles for different communicative purposes. Immersion students, forming a speech community of their own in the classroom, have similar social needs that demand they use their L1 or L2 to perform social functions. The study cites a French immersion graduate, Suzanne, who stated that the immersion program did not teach students a vernacular variety in the L2 that they need to discuss social topics with peers. Due to a lack of age-appropriate input in the L2, the authors posit that a diglossic situation seems to emerge in which these older immersion students use L1 for social interaction and reserve French L2 almost exclusively for academic purposes.

Blanco-Iglesias, Broner, and Tarone (1995) documented their observations of student L1 and L2 use in kindergarten through Grade 5 in a one-way early total Spanish immersion program in the U.S. The researchers observed 14 different classrooms for six weeks during the Spanish portion of the day in which the students were supposed to be hearing and using Spanish all the time. Most of the observations focused on second grade through fifth grade; three classrooms were observed in 10 to 15-minute increments for each of those grades and student interactions with their teacher and with each other were recorded in writing. These notebook data were organized and analyzed based into eight categories: (1) grade level; (2) total time observed in each classroom; (3) physical layout of the classroom; (4) activity; (5) teacher (including gender, L1, permanent/substitute); (6) language used in student-teacher and student-student interactions; (7) examples of interactions recorded in the notebook data; and (8) overall comments on the tone of the class. The findings were that “the children’s use of Spanish and English … varies from

grade to grade" (Blanco-Iglesias, Broner, & Tarone, 1995, p. 245), with students' use of Spanish increasing steadily through third grade in all contexts. However, in fourth and fifth grades, the fourth and fifth graders started to use more English to address the teacher and in conversation with one another, especially on social topics. The authors noted many English vernacular terms used by fifth graders, such as "cool" "you messed up", "jerk", "the funky thing", etc. The authors suggested that the patterns of language use they had observed in fourth and fifth grades supported Tarone and Swain's (1995) hypothesis:

> Pre-adolescents and adolescents need a vernacular style as a way of signaling their identities. They tend to mark their identity and identification with one another as adolescents in a number of ways: in their mode of dress, their hairstyles, their music preferences – and their use of vernacular language. It becomes important to most pre-adolescents and adolescents to present the right image and to "talk the right talk". The "right talk" is constantly changing as older adolescents move out of this particular age group and younger adolescents move in. The use of the accepted current vernacular terms ("cool it" vs. "squash it" or "that's cool" vs. "that's fresh") is central to the emerging adolescent's image and identity. (p. 30)

Blanco-Iglesias et al. (1995) listed methodological shortcomings of this preliminary study. First, it was not as easy to use notebook data to do quantitative analysis as audio-recorded data (Beebe, 1994). Notebook data can only provide an indication of a general pattern, but does not allow for a nuanced analysis of patterns of L1 and L2 use. In addition, the amount of detail provided in the notebook data was limited by the observers' background and the general research purpose they had. In this study, the two notetakers were Spanish speakers and were more interested in noting down instances in which students used Spanish than English during Spanish time. As a result, the notebook data failed to accurately reveal the entire pattern of student L1 and L2 use.

In light of these limitations, authors call for more systematic research using more rigorous data gathering techniques.

A series of studies focusing on math instruction was carried out by Cohen (1994), Heitzman (1994), and Parker, Heitzman, Fjerstad, Babbs and Cohen (1995). They investigated 5th and 6th grade U.S. Spanish immersion students' use of L1 and L2 in performing cognitive operations when they were solving math problems, as well as when they were talking to their teachers and peers in the classroom. Cohen (1994), Heitzman (1994), and Parker et al. (1995) are based on a subset of the same data set gathered from 32 English-speaking children in grades 3-6 in a one-way early total Spanish immersion program; the subset was from 5th and 6th grade only. These studies were based on (1) audio recordings of elicited verbal reports of student participants while they were working on math problems during Spanish time; (2) audio recordings of classroom observations with detailed fieldnotes; (3) audio recordings of questionnaire-based interviews with students about their opinions about thinking in Spanish and using Spanish for social communication; and (4) student background information in school files (Cohen, 1994; Heitzman, 1994; Parker et al., 1995). Elicited verbal reports were also used to shed light on the language that learners used in performing cognitive operations in solving math problems. These verbal reports were coded based on the language the learners used (Spanish, English, or both), and were further coded based on the following types: think aloud, self-observation (introspective and retrospective), and self-report. The classroom observation data were used to shed light on the general language use patterns in response to different interlocutors during different tasks and activities. Student interviews and student background information were used for data triangulation purposes.

The findings of these studies suggested that these 5th and 6th grade immersion students were using their L1 more than the immersion language to solve math problems, especially when the tasks were cognitively challenging or when they were solving numerical problems (Cohen, 1994; Heitzman, 1994; Parker et al., 1995). Although learners began processing problems in Spanish by reading them out loud to themselves, they tended to switch over into English if they ran into any problem. Whereas learners sometimes used Spanish to refer back to important ideas in a word problem, they tended to use English to do the planning for the problem. Learners were also observed to translate word problems from Spanish to English to facilitate cognitive processing. With examples extracted from transcripts, the authors suggested that some students' increased use of Spanish when solving math problems seemed to link to their higher levels of Spanish proficiencies and academic abilities. But as Cohen (1994) pointed out, the number of student participants was too small to make any generalizations and more extensive research along these lines would be needed.

Heitzman (1994) and Parker et al. (1995) also reported on students' use of L1 and L2 when they talked to peers and teachers in small groups as opposed to teacher-fronted settings. Both studies suggested that the students had a clear preference for Spanish in teacher-fronted, task-oriented situations; they almost never used English during teacher-fronted situations. However, when they worked in small groups by themselves, they used English to a greater extent than they used Spanish. Both studies also found that in those small groups, students tended to use English for social purposes, a finding in line with those of Tarone and Swain (1995) above. In fact, Parker et al. (1995, p.243) suggested

that they "observed no social use of Spanish" in grades 5 and 6. Heitzman (1994, p.17) similarly found that learners used Spanish "very occasionally with friends".

These findings by Cohen (1994), Heitzman (1994), and Parker et al. (1995) were clouded by critiques that they were based on data elicited by researchers who used English; it was possible that the researchers' English use might have primed students to use more English than they otherwise would have.

The first study that specifically looked at younger immersion children's overall L1 and L2 use in one-way immersion classrooms was Arnau and Bel (1995). Based in Barcelona, Spain. This study explored the extent to which different contexts promoted Catalan immersion kindergarteners' (4 years old) use of language in general and Catalan in particular. Audio- and video-recorded classroom interactions in oral language, math, and manipulative activity were gathered twice respectively at the beginning and the end of the school year. Four lessons were chosen for each content area; each lesson had an approximate duration of 20-30 minutes. Percentage-based frequencies were calculated to show children's language use in general and use of Catalan in particular in different contexts. The study found that students used more Catalan across the board at the end than at the beginning of the school year, indicating that duration of stay in the program might be a factor that influenced younger children's use of the immersion language. The study also found that children used more Catalan in oral language than in math lessons. Manipulative activity, in which the children played a lot of games and did a lot of extracurricular activities under the supervision of a teacher, generated the least amount of Catalan from the children. The authors suggested that during oral language and math lessons, most of the Catalan produced by the children was to answer the teachers'

questions, with few spontaneous expressions. Interlocutor was also mentioned as a factor that might affect these kindergartners' language choice; they tended to use more Catalan with the teachers than with their peers. The findings also showed that the children did a lot of language play in Catalan without influence on the part of the teacher. It may be important to note that the children were not observed to do a lot of language mixing; only around 7% of their speech was coded as mixed at the two time points of data collection in each of the three content areas, although in a manipulative activity at the second time point of data collection, 16.6% of their output mixed languages.

Arnau and Bel's study contributed to the field as the first study to offer valuable information about younger monolingual children's language use in a one-way immersion program. However, as the authors openly acknowledge, the object of this study was "more to define variables and note down hypotheses, […], than to reach definitive conclusions" (p. 112). Much more data would be needed for firm conclusions about the effect of different contexts on children's language choice, and inferential statistics would be needed to generalize their findings to kindergartners in all one-way immersion programs.

In Canada, Swain and Lapkin (1998) explored much older Canadian French immersion students' L1 and L2 use when they were engaging in language-related collaborative tasks. Data were collected as eighth grade French immersion students carried out a jigsaw task in pairs, during which each pair worked out a story line and wrote it down. Student conversations were audio-recorded. Focusing on one pair of these learners, language-related episodes (LREs) occurring when these learners encountered linguistic problems were identified and transcribed. The study found that the student

participants used both L1 and L2 to communicate information with each other and as tools to mediate their learning (Vygotsky, 1979). Transcript examples were presented to show that when the students met problems, they tended to talk themselves through, and when it appeared to be a hard problem, they tended to do so in their first language English:

Kim:	*Du réveille-matin qui sonne*? Does that sound OK? (of the alarm-clock that rings? Does that sound OK?)
Rick:	Or what about...*Jacqueline se léve a cause du...du réveill*-...yeah, *qui sonne*. (Or what about...Jacqueline [the girl in the story] gets up because of the...of the alarm- ...yeah, that rings.)
Kim:	OK. Or you can say, *du réveille-matin*, or *du sonnement du réveille-matin*. (OK. You can say, of the alarm clock, or the ring of the alarm clock.)
Rick:	No, *réveille-matin qui sonne*. (No, alarm-clock that rings).

(Swain & Lapkin, 1998, p. 329)

Swain and Lapkin suggest that the cognitive load of academic tasks seems to be an underlying factor that affects immersion students' use of L1 or L2. They make a broader argument than Cohen and his research associates (i.e., Cohen, 1994; Heitzman, 1994; Parker et al., 1995), claiming that the switch to L1 is really due to cognitive load, and it does not just happen with math; it happens with language arts too. As such, the authors conclude that, as long as the final product submitted to the teacher is in L2, immersion students' L1 should be permitted when they work on academic tasks, especially those that appear to be cognitively challenging, because the first language is a mediational tool that students can fully leverage to regulate their thinking and mediate their learning.

Broner (2001) response to the call of previous researchers to systematically examine the role of L1 and L2 in immersion classrooms. Using a sociolinguistic variationist framework for SLA, Broner (2001) examined the impact of interlocutor and task on the L1 and L2 use of three English-speaking fifth-grade Spanish immersion students (Leonard, Marvin and Carolina) in a one-way Spanish immersion program in the United States. She focused on these pre-adolescents' language use (slang and references to pre-adolescent culture) and metalinguistic themes appearing in the two languages. Data included (1) 13 hours of audio-recorded student verbal interaction during academic time; (2) systematic classroom observations with field notes; and (3) interviews with the teacher and the three focal student participants. The three focal student participants' verbal interactions were transcribed and coded based on the dependent variable (i.e. Spanish, English, Mix <Spanish base>, Mix <English base>) and independent variables were categorized into *linguistic contexts* (e.g. clause type, accuracy, style, etc.) and *non-linguistic contexts* (i.e. interlocutor, task content, task activity, task: on/off). Quantitative data analysis included use of chi-square tests to statistically verify a relationship/correlation between the dependent variable and each independent variable, and then VARBRUL (Binomial Variable Rule Analysis), a multiple regression measure developed for use in sociolinguistic studies, was used to show which independent variable(s) and factor(s) significantly promoted each student participant's Spanish use in the presence of all the other variables and factors. Mixed-code tokens were not included in the quantitative analysis because (1) VARBRUL only allowed for binary dependent variables, and (2) there were very few mixed-code tokens in her data (106/4737).

Qualitative discourse analysis was carried out on key interactions to help explain the quantitative results.

As a group, Broner's three fifth graders used more Spanish (64%) than English (36%). Chi-square results showed that interlocutor, task content, task activity, and on/off task were each significantly related to each student participant's language choice in the classroom. VARBRUL analysis discarded task activity as a significant influence on L1 and L2 use for two of the three child participants (i.e., Marvin and Carolina), leading to the elimination of task activity for Leonard because the VARBRUL model could not converge with this factor present.

VARBRUL showed that three child participants always used Spanish when talking to the teacher, but when the interlocutor was another peer, other variables (e.g., the content of the activity, being "on/off" task, social relationships, etc.) came into play. Qualitative analysis of the transcripts revealed that the three children accommodated to each other's language choice in a way that seemed to relate to the roles that each of them played in the classroom. For example, Marvin almost always spoke Spanish to other children, and even though he was not popular, his presence clearly had an impact on Leonard's and Carolina's language use, because both of them accommodated to Marvin by using more Spanish with him.

In terms of the task effect, VARBRUL showed that all three child participants used more Spanish than English when they were on-task than off-task, and tended to use Spanish to a greater extent when the task was language-related (i.e., creative writing, reading) than when it was nonlanguage-related (e.g., solving math problems). Creative writing in particular significantly promoted the children's use of Spanish. Qualitative

analysis suggested two possible reasons. First, the children had to produce some kind of written manuscript in Spanish L2 at the end of the activity, and second, they had to focus more on the L2 to be able to carry out these activities. All three children overwhelmingly preferred their L1 to refer to pre-adolescent culture (e.g., pop culture, music, TV shows); their use of slang and vernacular words in L2 were extremely rare. Broner suggests this finding supports Tarone and Swain's (1995) hypothesis that a diglossic situation emerges in the upper elementary grades in which immersion children make a functional distinction between use of the L1 and the L2: the L2 is used primarily for academic purposes and the L1 primarily for social purposes.

Broner's (2001) findings do not accord with those of Heitzman (1994) and Parker et al. (1995) that Spanish was rarely used by students amongst themselves. This discrepancy may be caused by the different data gathering techniques employed in these studies. Whereas Broner (2001) gathered 13 hours of naturally occurring student interactions which included thousands of tokens, Heitzman's (1994) and Parker et al.'s (1995) claims were based on only 51 instances with at least one adjacency pair; in these instances, the children were not alone since there was always an adult researcher present, sitting by their desk and observing their behaviors.

Broner (2001) had a very robust study design and carries a lot of weight in the field. However, a methodological problem was that running VARBRUL with the software program GoldVarb did not allow the flexibility of studying interlocutor as a random effect. Following Johnson (2009), because the interlocutor variable had to be included in the model as a fixed-effect, the program underestimated the significance of extralinguistic effects by eliminating them from the best run, even when they might have

been truly significant over and above individual variation (please see the methodology section for a full review). So, for example, this means that the reason "task activity" was eliminated for the data sets of Carolina and Marvin by the model was not necessarily because task activity was not statistically significant *per se*, but perhaps because it was underestimated by the model because interlocutor was considered a fixed-effect.

In more recent years, the number of Chinese immersion programs in the U.S. has increased exponentially, from 128 in 2012 to 337 in 2021 (Mandarin Immersion Parents Council, 2021). The earliest study of L1 and L2 use in a Chinese immersion context was Wang's project (2008), which examined the classroom processes and the teachers' experiences in a one-way 50/50 Chinese immersion program in the U.S using a cross-sectional study design. Data were gathered in four classrooms of Grade 2, Grade 4, Grade 5, and Grade 8 using a variety of data collection techniques: (1) video-recorded classroom observations in each classroom for one hour and a half every week for a total of 8 weeks; (2) detailed fieldnotes about the classroom processes and activities; and (3) interviews with the teacher participants. Classroom activities were coded into different categories and were analyzed qualitatively. Wang found that the four Chinese immersion teachers employed a variety of teaching strategies to promote learning, which included but were not limited to maximizing students' opportunities to receive comprehensible input and to produce output in Chinese, using group-work to encourage interaction, and employing a student-centered teaching approach to maintain a low-anxiety learning environment. The overall frequency of Chinese use in each classroom was high, although patterns differed across grade levels. Specifically, the second graders were observed to frequently respond to the teacher's questions in code-switched patterns because of their

limited Chinese vocabulary. When the students talked to their peers informally, they tended to use English, but this occurred rarely, due to a Chinese-only policy. The second-grade teacher was observed to use a lot of drills and ask many yes/no questions to elicit guided Chinese production. Interviews with the second-grade teacher showed that she saw the major purpose of interaction to be to reinforce a close teacher-student relationship rather than promote linguistic output. The fourth and fifth graders' enhanced Chinese proficiency reduced the frequency of switches to English words used to replace unknown Chinese words. At this stage, Chinese became the language that the students predominantly used to address each other during group work. Similar patterns of Chinese use occurred in eighth grade as well, but the students' level of proficiency could not support discussions on complicated social and academic topics that required complex Chinese grammar and a large body of domain-specific vocabulary. Unlike the second-grade teacher, the teachers of fourth-, fifth-, and eighth-graders provided ample opportunities to push student output in Chinese with a variety of small-group activities and presentations. Wang concludes that the immersion students' use of Chinese related to their Chinese proficiency, vocabulary capacity in particular, and the teachers' pedagogical and instructional practices.

Wang's findings on second graders' language use, however, are different from those of Arnau and Bel (1995) for kindergartners in the following ways: (1) Wang's second-graders rarely spoke English with each other, while Arnau and Bel's kindergarteners tended to speak L1 among peers; (2) whereas Wang's second graders used a lot of code-switching utterances to answer the teachers' questions, percentage-based frequencies in Arnau and Bel showed that code-mixed utterances produced by

kindergartners when they addressed their teacher was very low. Wang's finding that 4th and 5th graders predominantly used L2 with peers during group work differs from Broner's (2001) finding that her 5th graders used not only L2 but also a lot of L1 when addressing peers during academic time. It is worth noting that the primary purpose of Wang's (2008) dissertation was to investigate Chinese immersion teachers' teaching practices and not to gather and analyze data on students' language use. Her conclusions about student language use were based on observations and general impressions, not on systematic analysis of student speech production. This methodological limitation might partially account for the differences in results among the three studies.

Dorner and Layton (2014) examined first-grade Spanish immersion children's multilingual discourse in a one-way Spanish immersion program in the U.S. Fieldnotes of classroom observations and six hours of video-recorded classroom interactions were gathered over the course of four months. Student verbal interactions were transcribed and analyzed qualitatively to identify patterns in terms of who supported student language use and how it was supported. Qualitative analysis suggested that teacher-structured whole group activities promoted students' use of Spanish, whereas small group activities fostered use of both Spanish and English. Examples extracted from transcripts showed that teacher-led whole class activities were highly scripted, with target language structures carefully modeled and explained by the teacher; in these activities, students were doing a lot of scaffolded practice in Spanish by using target structures with new words and phrases to express their thoughts and ideas. In contrast, during small group activities, students' interactions were not scripted at all, and they were observed to explore a variety of topics in English, unless the teacher was present.

Dorner and Layton's findings seem to be similar to those documented in Arnau and Bel (1995), in that younger children tended to use the L2 to talk to the teacher but switch to the L1 to talk to each other. Dorner and Layton's first-graders' language use was different from that of Wang's (2008) second graders. Both Dorner and Layton (2014) and Arnau and Bel (1995) found that these younger children's L2 use during teacher-structured activities did not seem to involve much spontaneous use of the L2, rather their L2 oral production seemed to be scripted and carefully monitored by the teacher. However, recall that the data base for both Dorner and Layton (2014) and Arnau and Bel (1995) was limited to only a couple hours of recorded classroom interaction.

Bucknam (2016) investigated first-grade Chinese immersion students' use of Chinese vs. English in a one-way 50/50 Chinese immersion program in the U.S. Four focal student participants were selected; three were English L1 speakers and one was a Chinese/English bilingual. Five hours of audio- and video-recorded focal student interactions during math and Chinese language arts were gathered, and a focal group interview was conducted for data triangulation purposes. Student verbal interactions were transcribed and explicitly analyzed based on four pre-identified areas of focus: number of turns, type of vocabulary (academic vs. non-academic), grammatical accuracy, and linguistic functions. Percentage-based frequencies were calculated to identify patterns in each area of focus. The student participants' turns were further coded in the following seven categories representing different language use situations: (1) repeat after teacher; (2) repeat after teacher, then initiate; (3) initiate, (4) respond to a student; (5) respond to teacher with group; (6) respond to teacher individually; and (7) self-talk. Finally, all student-initiated sentences were coded based on pre-determined linguistic functions,

including (1) heuristic; (2) informative; (3) instrumental; (4) interactional; (5) personal; and (6) regulatory.

Bucknam found that, as a group, the focal participants produced more turns in Chinese (61%) than in English (34%) and in code-switch forms (5%). Her first-graders' percentages of L2 and L1 use are very similar to those of Broner's (2001) Spanish fifth graders. Bucknam also showed that the student participants' language choice was related to subject matter and interlocutor in that they used more Chinese in Chinese language arts than in math, and tended to use more Chinese to address the teacher than when addressing their peers. Bucknam's findings are consistent with those of Arnau and Bel in their kindergarten classroom in a Catalan immersion program in Spain. Bucknam suggests that the difference in her students' Chinese use in Chinese language arts and math might be because (1) more teacher-fronted activities were carried out in Chinese language arts than math, and (2) compared with Chinese language arts, math instruction focused more on content than language. Bucknam also found that the focal student participants produced more turns in Chinese language arts than in math.

Descriptive statistics showed that the student participants received predominantly more opportunities (76%) to address the teacher in a variety of situations than each other and themselves (24%), indicating a highly monitored, teacher-centered participation structure in both subject areas. In addition, most of the student participants' Chinese turns contained academic vocabulary, whereas a large proportion of their English turns contained non-academic vocabulary. A classification of the student participants' utterances into words, phrases, and sentences showed that a majority of the Chinese turns were words and phrases as compared to their English turns, a majority of which were

sentences. An abbreviated error analysis suggested that some of the students' grammar errors seemed to be caused by negative linguistic transfer from English to Chinese. Descriptive statistics showed that student participants used more English than Chinese in all six linguistic functions examined, but especially in the informative, the interactional, and the personal functions. Bucknam concluded that diglossia may be the norm in this first-grade Chinese immersion classroom, because the children tended to use Chinese for academic purposes but carried out social conversations primarily in English. According to the author, three factors might help explain this observation. First, as in previous studies, the children did not get enough L2 input of vernacular forms needed to carry on social conversations and to discuss social events. Second, peer interactions were less monitored than teacher-fronted instruction; as a result, in peer interactions, the children were observed to be off-task due to a lack of task-management skills. Third, Bucknam argued that some students' cultural backgrounds tended to be more relational, which made them focus more on peers than tasks, thus leading to more use of English for off-task behaviors.

Bucknam's study has several limitations; First her data base was relatively small, consisting of five hours of audio- and video-recorded student verbal interactions; she used a much weaker statistical tool (i.e. percentages) than the VARBRUL tool used by Broner (2001); and the teacher's routinized teaching schedule made it impossible for the author to collect speech samples that reflected the full range of student language use and variation in a variety of tasks and activities, including pair work and/or group work in which a good deal of peer interactions may occur.

The most recent study of language use in early-grade Chinese immersion programs is Sung and Tsai (2019); they documented first-grade Chinese immersion students' translanguaging practices and their functions in a one-way Chinese immersion program in the U.S. Audio-recorded classroom interactions were gathered at the beginning, middle and end of the school year, with an audio-recorded placed in the homeroom teacher's pocket. The study showed that students' translanguaging practices diminished steadily over the year. The author ascribed the decrease to the implementation of a strict Chinese-only language policy in the second term, and argued that this monolingual ideology that was embodied through the program language policy limited student learning. Sung and Tsai's (2019) argument seems implausible. The role that translanguaging played in support of student learning might be overestimated, because the authors' argument was simply based on 282, 219, and 87 instances of student translanguaging practices, and it is not clear what the percentage of the students' translanguaging utterances is as compared to the students' utterances in Chinese or in English. Recall that Arnau and Bel (1995), Broner (2001) and Bucknam (2016) found that one-way immersion students, regardless of grade level, tended to produce a very small proportion of code-switching utterances. The role of translanguaging practices cannot be fully understood without first studying the roles of L1 and L2 in immersion classrooms.

Summary and Critique of Literature on One-way Immersion Children's L1 and L2 Use

The literature review in this section reveals interesting trends and patterns of students' L1 and L2 use in one-way immersion programs, particularly for children in the early grades. First, older immersion children do not always use the L2, arguably because

they need a vernacular variety for preadolescent purposes, and because they have not learned a vernacular variety in L2. Factors of interlocutor and task were also found to play an important role in conditioning older immersion students' choice between L1 and L2, as they tended to use L2 with the teacher but switched to L1 to talk to peers (Heitzman, 1994; Parker et al., 1995; Broner, 2001). On-task situations tended to promote more L2 use as compared to off-task situations (Heitzman, 1994; Parker et al., 1995; Broner, 2001). Language-related content areas tended to promote L2 use to a greater extent than non-language related content areas (Broner, 2001).

Interestingly, similar patterns of first and second language use and possible influential factors have also been identified among younger immersion children by some studies (Arnau & Bel, 1995; Dorner and Layton, 2014; Bucknam, 2016). These parallel patterns, however, need to be further tested and verified because of a lack of methodological rigor of most studies on younger learners, especially those whose claims have been based on only a few hours of recorded student verbal interactions (5-6 hours) (Arnau & Bel, 1995; Dorner and Layton, 2014; Bucknam, 2016). The impact of interlocutor and task factors was not carefully measured using inferential statistics to show significance, and there is insufficient information on the reasons why different interlocutors and tasks affect younger children's language use the way they do. Additionally, not every study came to the same conclusions about younger learners' use of L1 and L2. In fact, Wang (2008) reported findings contradictory to Arnau and Bel (1995), Dorner and Layton (2014) and Bucknam (2016) that second graders mixed their language to address the teacher and rarely used English to speak to each other. Wang (2008) ascribed her findings to younger learners' Chinese proficiency, vocabulary

capacity in particular, and the teachers' pedagogical and instructional practices. This discrepancy could be caused by Wang's (2008) unsystematic analysis of children's verbal interactions, which is also a clear call for rigorous data gathering and analysis techniques to study younger immersion children's language choice.

Additionally, from a sociocultural perspective, older immersion children have been observed to switch to their first language to mediate learning when they meet academic problems, not only in math but in language arts (Cohen, 1994; Heitzman, 1994; Parker et al., 1995; Swain and Lapkin, 1998). These claims and findings need to be tested and expanded with data gathered from younger immersion learners.

Finally, an interesting theme that emerged from the literature review is about younger children's use of language mixing or translanguaging practices in one-way immersion. Based on Arnau and Bel (1995), Broner (2001), and Bucknam (2016), it seems that immersion students tend to produce a very small proportion of code-switched or language-mix utterances regardless of grade level. These findings and claims about younger immersion students' translanguaging practices need to be further tested and expanded with large bodies of data gathered with more rigor and systematicity.

Unit of Analysis

Because the present study will require a quantitative analysis of the focal student participants' use of English and Chinese, and because possible future analyses will explore in detail the children's development of Chinese interlanguage features/rules, a decision must be made about what unit to use for quantitative analysis. For that purpose, the following section reviews the literature on units of analysis that have been used for quantitative analysis of Chinese interlanguage. In studies of Chinese interlanguage, a

variety of units has been employed to segment learners' speech for analysis. Popular units have included the clause (Polio, 1995), the utterance (Zhang, 2002; 2004), the T-unit (Yuan, 2009; Zhai & Feng, 2014), the sentence (Jin & Mak, 2012; Ye, 2015), and the AS-unit (Chen, 2015; Fortune & Ju, 2017). These units have generally been used to fulfill two overarching research purposes: (1) to measure the frequency of accurate use of certain Chinese linguistic features (Polio, 1995; Zhang, 2002; 2004); and (2) to assess learners' performance on complexity, accuracy, and fluency (CAF) to present a global picture of Chinese interlanguage development (Yuan, 2009; Jin & Mak, 2012; Zhai & Feng, 2014; Chen, 2015; Ye, 2015; Fortune & Ju, 2017). Although neither research purpose overlapped with the purpose of the present study, the researchers' choices of and insights on the units of analysis they employed in their studies informed the selection of unit of analysis of the present study.

Preliminary review of Chinese interlanguage studies established that not every study clearly stated and defined the analytical unit that was used in analysis of speech, especially studies looking at the frequency of correct usage of certain Chinese linguistic features (e.g., Jin, 1992, 1994; Polio, 1994; Wen, 1995, 1997, 2006; Zhao, 2000; Yang & Roever, 2013). The researchers' ambiguity in specifying unit of analysis is understandable given that their primary goal was to identify instances of the target linguistic structure under study, not to achieve a high level of consistency in data segmentation. In the following section, I will review and summarize studies in which the unit of analysis of oral Chinese interlanguage was specified, and then I will compare and critique how those units were used to parse the flow of speech. The review is organized in terms of the unit of analysis used, in the following order: clause (Polio, 1995),

utterance (Zhang, 2002; 2004), T-unit (Yuan, 2009; Zhai & Feng, 2014), sentence (Jin & Mak, 2012; Ye, 2015), and AS-unit (Chen, 2015; Fortune & Ju, 2017). In general, it appears that the year of publication of these studies demonstrates Chinese L2 researchers' shifting preference over the past three decades for using one or another type of analytical unit.

Clause

Polio (1995) studied and compared the use of zero pronouns in oral Chinese interlanguage by speakers of English L1 (a language without zero pronoun in most instances) and speakers of Japanese L1 (a language with considerable use of zero pronoun). 21 English speakers and 21 Japanese speakers at three Chinese proficiency levels – low, intermediate, and high – participated in the study. Chinese interlanguage was elicited by a 7-minute film, the *Pear Story* (Chafe, 1980). The learners were first shown the movie and then were asked to retell what they had seen in the movie in as much detail as possible to a native speaker of Chinese. The native speaker did not interact with the learner unless the learner's speech was incomprehensible in some way.

The data were transcribed in pinyin and were checked by a native speaker of Chinese (Polio, 1995, p. 362). To study learners' use of zero pronouns, the author drew on the Chinese linguistic concept of serial verb construction – "a sentence that contains two or more verb phrases or clauses juxtaposed without any marker indicating what the relationship between them is" (Li and Thompson, 1981, p. 593), and made the clause her unit of analysis. The author also mentioned difficulty in determining clause boundaries in Chinese interlanguage, especially in cases where two verbs were contiguous. To solve this problem, Polio (1995) used the learner's intonation and pauses:

> if there was a pause before the second verb or a "listing" intonation as one might use in the English sentence, "he rode a horse, smoked, and fell asleep," they were counted as separate clauses. (p. 363)

A big methodological contribution of Polio (1995) is her proposal to use the acoustic features of pause and intonation, rather than simply rely on Chinese linguistics, in segmenting Chinese interlanguage into clauses. However, Polio (1995) did not specify precisely what the parameters of intonation and pausing were that helped her identify clause boundaries. It is also not clear how the intonation and pausing patterns of English can be applied to the segmentation Chinese interlanguage produced by Japanese L1 speakers.

Utterance

Zhang (2002) investigated the developmental path of *-de* as a genitive marker (GEN) and as an attributive marker (ATT) in the Chinese interlanguages of adult English L1 learners of Chinese. Longitudinal oral data were collected over a period of one academic year (37 weeks) from three English-speaking learners who enrolled in their first-year intensive Chinese language course in an Australian university. During each data collection session, an individual learner worked with an interviewer on a number of oral communicative tasks, including picture description, story retell, oral composition and role play. The learners' speech in Chinese was audio-recorded and transcribed.

Adopting an interlanguage-oriented perspective, the author parsed the data into utterances, where utterance was defined as a unit that was "potentially complete as a relevant conversational action in the context (Liddicoat, 2001, p. 8, see also Sacks, Schegloff and Jefferson, 1974)" (Zhang, 2002, p. 87). The author further noted that "technically, [an utterance] was similar to a c-unit which was not always 'accompanied

by a verb, but which [has] a communicative value, [and] can be coded' (Crookes, 1990, p. 184)" (p. 87), and that a useful utterance was one which was "semantically and grammatically complete in the local context (which did not equal to grammatically well-formed)" (p. 87). Non-useful utterances included verbatim repetitions, translations of a previous utterance, interjections, and non-lexical fillers (e.g., ah, mmh).

Zhang (2002) made a big methodological contribution to Chinese L2 research by adopting an interlanguage-oriented perspective in her analysis. She pointed out that "to recognize and accept the concept of interlanguage means that one must move away from the analytical perspective of using the target language as the ultimate "norm" against which IL is measured" (p. 81). From the way she conceptualized utterances, we see that an utterance can be a chunk that does not have to be "accompanied by a verb" (Crookes, 1990, p. 184, cited in Zhang, 2002). In the same way, the interlanguage-oriented approach allowed her analysis not to be influenced by the grammar of the native language, English (c.f. Foster, Tonkyn & Wigglesworth. 2000). One methodological limitation of her approach, however, is that the author did not specify the standards and tools she used to segment one utterance from another. In other words, if we view interlanguage as a linguistic system of its own, the rules of which we are not sure, then what clues from the learner language can we leverage to help us determine utterance boundaries? Are these acoustic features like intonation contours and pauses, as used in Polio (1995)? Or something else? Whatever the tools and standards used, a specification is needed. The author published another study on the same topic, using the same data set, and defining utterance in the same way (Zhang, 2004); unfortunately, that study suffered from the same reporting limitations.

T-unit

Yuan (2009) discussed the theoretical, methodological and practical aspects of CAF analysis in general SLA and investigated its application to the spoken language performance of L2 Chinese. An intermediate English speaker of Chinese was recorded while doing an in-class oral task. A small part of the learner's speech was transcribed. To gather baseline data, a native speaker of Chinese was asked to retell the same experience based on an English translation of the learner's transcript. That Chinese native speaker's speech was also audio-recorded and transcribed.

The author (Yuan, 2009) segmented both transcripts into different units depending on the specific dimension she investigated. To study the feasibility of applying fluency measures (speech rate, false pause, and self-repair) and accuracy measures (percentage of error-free clauses, error density, and number of repairs) to Chinese, the author segmented the transcripts into clauses, where 'clause' was defined as a structure "minimally consisting of a predicate of various forms" (Chu, 1998, p. 354, cited in Yuan, 2009, p. 113). To investigate the applicability of syntactic complexity measures to Chinese IL, the author segmented the transcripts into both T-units and clauses for the purpose of comparison with previous findings (Hunt, 1976; Jin, 2007). The author defined T-units as "the shortest units into which a piece of discourse can be cut without leaving any sentence fragments as residue" (Hunt, 1970, p. 188, cited in Yuan, 2009, p. 125) and as "one main clause with all subordinate clauses attached to it" (Hunt, 1965, p. 20, cited in Yuan, 2009, p. 125). However, the author also argued that while the T-unit was a reliable index for measuring complexity of Indo-European languages, it might not be an appropriate measure for Chinese because clause coordination and subordination are

not shared by Chinese and Indo-European languages. Thus, measurements based on length failed to show the specific manifestation of Chinese interlanguage development. The author pointed out that future research is needed to examine the validity of those measures and units of analysis on L2 Chinese. Despite Yuan's (2009) opinion that her application of T-units to the segmentation of Chinese interlanguage was problematic, the T-unit seemed to be well-liked for this purpose by Zhai and Feng (2014). Zhai and Feng (2014) studied Chinese adult learners' fluency and accuracy development over a period of two months. Twelve beginning learners of Chinese with different L1s completed the same picture-cued oral description task at the beginning and end of the two-month period. Their oral performance was audio-recorded and transcribed. In this study, the speech samples were segmented into T-units for an accuracy analysis. The authors defined a T-unit as "a complete sentence that includes relevant components and structures" (Zhai & Feng, 2014, p. 3).

Zhai and Feng (2014) suffered from two methodological limitations. First, the authors did not justify the validity of adopting the T-unit as an analytical tool in the study of oral learner language of Chinese. This justification is very important because the T-unit is an English-based syntactic unit developed to measure syntactic development in the written work of schoolchildren (Hunt, 1965, 1966, 1970), so applying the T-unit to the study of oral Chinese interlanguage is basically borrowing a construct from one linguistic system to analyze another linguistic system. Second, the authors' definition of the T-unit's boundaries was vague and oversimplified. This is problematic because the unit boundary affects the measurement of accuracy. For example, the authors' definition of a T-unit makes it equivalent to a complete sentence. However, given the fuzziness of

sentence boundaries in Chinese (e.g., Jin & Mak, 2012), it is necessary for the authors to provide a clearer operational definition of the boundaries of the analytical T-unit.

Sentence

Jin and Mak (2012) explored the relationship between the distinguishing features of Chinese L2 speech and the scores given by raters to the learners' speech performance using a holistic rating scale. Audio-recorded Chinese L2 speech samples were gathered from 66 advanced learners of Chinese, a majority of whom spoke Japanese and Korean as their L1s.

Seven distinguishing analytical features were identified under the four categories of pronunciation, fluency, vocabulary, and grammar. The seven distinguishing features were (1) target-like syllable per 10 syllables, (2) speech rate measured by number of syllables per second, (3) pause time measured by average duration of unfilled pauses longer than 1 second, (4) word tokens, (5) word types, (6) grammatical accuracy measured by percentage of error-free sentences, and (7) grammatical complexity measured by mean length (number of syllables) of sentences. Thus, the analytical units were the syllable, the word, and the sentence; the latter was used to analyze grammatical accuracy and complexity. Claiming that T-unit did not work for Chinese, the authors used the sentence as the basic unit for this purpose, using Tang's (2010) definition of the Chinese sentence which unfortunately was not clearly specified in this paper. Acknowledging the challenges in identifying the boundaries of such sentences, the authors applied two complementary criteria: semantic and syntactic completeness, using context and sentence intonation and pause duration to identify the unit boundaries.

In another study, Ye (2015) compared the complexity, accuracy, and fluency of Chinese L2 speech among learners of different proficiency levels, and examined the interactions among the three dimensions. Audio-recorded speech samples of 45 English speaking learners of different proficiency levels were gathered using picture-cued oral description tasks. The data were transcribed and segmented into sentences in preparation for measures of accuracy and complexity. Unfortunately, like Jin and Mak (2012), Ye (2015) did not provide a clear operational definition of sentence and did not justify why sentence is a valid unit to study Chinese interlanguage.

Although the authors (Jin & Mak, 2012; Ye, 2015) used the sentence as an alternative to the T-unit to parse Chinese L2 speech, neither appears to be a valid unit for parsing Chinese IL. This is because both are syntax-oriented units; the T-unit is based on the native language and the Chinese sentence is based on the target language. Applying either unit to the segmentation of interlanguage is fallacious because interlanguage is a separate linguistic system of its own (Selinker, 1972; Tarone, 2018). Interestingly, the authors did point out the important role of intonation, pause, and context in parsing Chinese L2 speech. This idea dovetails with Polio (1995) in that Polio (1995) used the same acoustic features (i.e. intonation and pause) to segment clauses.

AS-unit

The AS-unit was developed for analysis of speech, to replace the T-unit, which was argued to only be suitable for writing language because of the elliptical nature of spoken language resulting in incomplete sentences. Foster, Tonkyn, and Wigglesworth (2000) defined the AS-unit as "a single speaker's utterance consisting of an *independent clause, or sub-clausal unit* [phrase]*,* together with any *subordinate clause*(s) associated

with either" (p. 365). This unit of analysis was also employed by researchers to study Chinese interlanguage (Chen, 2015; Fortune & Ju, 2017).

Chen (2015) measured the complexity, accuracy and fluency of spontaneous speech in Chinese by 44 English L1 speakers. In this study, syntactic complexity was measured by (1) words per AS-unit; (2) clauses per AS-unit; (3) level of syntactic difficulty per AS-unit; and (4) number of conjunctions. Accuracy was measured by (1) ratio of erroneous AS-units to total AS-units; (2) ratio of erroneous words to total words; and (3) pronunciation accuracy, which was further measured by erroneous tones per AS-unit, and number of erroneously pronounced consonants and vowels. Chen (2015) used Foster et al.'s (2000) definition of AS-unit, arguing that the AS-unit was a valid analytical unit because it dealt with dysfluent features of oral language, such as false starts, repetition, and corrections.

While both Chen (2015) and Yuan (2009) included Chinese native speaker baseline data, the authors did not explain clearly how they applied the English-based analytical units they used (AS-units and T-units) to Chinese, a language that is very different from English. How can an English-based unit be a one-unit-fits-all solution to parse both L1 Chinese and Chinese interlanguage?

Fortune and Ju (2017) assessed and explored the oral proficiency of 277 young Chinese immersion students in the U.S., enrolled in kindergarten, 2nd grade, and 5th grade. Data were gathered in video- and audio-recorded SOPA/COPE interviews. The speech samples of one student whose proficiency level presented the median score of their respective grade levels were selected for linguistic complexity analysis. The focal student's Chinese speech was transcribed and segmented into AS-units, defined as being

"made up of an independent clausal unit or a sub-clausal unit, and any associated subordinate clauses that are not separated by a .5 second or greater pause" (p. 274). The authors identified the boundaries of AS-units in Chinese based on *topic/event*, to mark the ends of independent clauses in Chinese (Xu, 1991, cited in Fortune and Ju, 2017, p. 274).

While Fortune and Ju (2017) considered the unique linguistic features of Chinese and made adaptations to the definition of AS-units to fit Chinese, the study suffered from the same problem as Chen (2015), Ye (2015) and Zhai and Feng (2014) in that not enough justification was provided in terms of why the AS-unit, an English-based syntactic unit, is valid in segmenting Chinese interlanguage.

Summary and Critique of Literature on the Unit of Analysis of Chinese Interlanguage

This section has reviewed key studies analyzing Chinese interlanguage. A variety of analytical units were employed to segment IL discourse. These units included the clause (Polio, 1995), the utterance (Zhang, 2002; 2004), the T-unit (Yuan, 2009; Zhai & Feng, 2014), the sentence (Jin & Mak, 2012; Ye, 2015), and the AS-unit (Chen, 2015; Fortune & Ju, 2017). All of these units are syntax-oriented units except for the utterance. A primary short-coming of applying syntax-oriented units to interlanguage is that they impose a set of rules from the NL or TL upon the interlanguage system, which must be assumed to be a distinct linguistic system (Selinker, 1972).

According to Selinker (1972), interlanguage (IL) is a separate linguistic system that differs systematically from both the learner's native language (NL) and the target language (TL). Tarone (2018) further explains that

> the IL is not just a relexification of the NL morphosyntactic system – NL rules with TL vocabulary; in other words, NL transfer is not the only process that shapes IL. Just as clearly, what the learner is producing is not the TL

> morphosyntactic system – the IL has a distinctive and systematic set of rules that differs in describable ways from the TL rule system. (p. 2)

When learners are trying to communicate meaning in the target language in unrehearsed situations, they are using an IL linguistic system that draws upon two other linguistic systems (NL and TL). An interlingual unit is needed to bridge, and document relationships between, the three parallel linguistic systems (Selinker, 1972). Selinker (1972) pointed out that an interlingual identification is one "which can be described simultaneously for parallel data in the three systems" (p. 224). A core tenet of linguistic analysis is that "units are defined in relation to the linguistic system in which they occur, and have no meaning outside that system. However, in making interlingual identifications, second language learners perceive a linguistic unit as the same in meaning across three systems" (Tarone, 2018, p. 3). Such a conceptualization requires the interlingual unit to have a semantic nature; it is semantic content that can be the same across different linguistic systems, each of which requires a different syntactic realization of the same semantic content. Indeed, Selinker (1972) argued that there is no necessary connection between such an interlingual unit and any unit of syntactic theory. Thus, it is problematic to use syntactic units like clause, sentence, T-unit and AS-unit to analyze interlanguage and its relationship to NL and TL.

Based on interlanguage theory (Selinker, 1972; Tarone, 2018), I propose that the utterance, as defined by Crookes (1990) below, be used as the analytical unit for segmenting the speech of multilingual speakers (e.g., Zhang, 2002; 2004). Zhang (2002, 2004) used the utterance to segment Chinese interlanguage, though her definition of

'utterance' was a little broad and lacked specification of the standards and tools to determine utterance boundaries.

Crookes (1990) compared turns, T-units, tone-units, and utterances as analytical units for segmenting speech and concluded that the utterance is the best for analyzing IL data. (AS-unit (Foster et al., 2000), however, was not compared in his paper, because it had not been proposed yet.) Crookes (1990) used a specific and useful definition of utterance, initiated by Crookes and Rulon (1985): an utterance is a stream of speech with at least one of the following characteristics:

(1) under one intonation contour,
(2) bounded by pauses, and
(3) constituting a single semantic unit.

Crookes (1990) cited research to justify using intonation contours and pauses as valid standards to identify the boundaries of utterances, arguing that the ends of intonation contours usually, but not always, coincide with the ends of syntactically defined units (Cooper & Sorenson, 1981). Importantly, each utterance defined in terms of intonation contours and pauses was observed to coincide with "breath-groups" (Lieberman, 1984, p. 118). That is, intonation contours and pauses result from the physiological processes involved in the creation of an utterance. Lieberman (1984) suggested that speech is overlaid on breathing. The falling pattern of pitch and volume of an utterance defined the "unmarked," or normal, breath-group (Lieberman, 1984, p. 120). Lieberman (1984) also pointed out that some utterances can be produced in a "marked" breath-group that has a rising or level pitch, such as English yes-no questions (p. 120).

Crookes's (1990) third criterion was coherence of meaning being conveyed in an utterance. This coherence of meaning was intuitively felt based on the context of the

utterance and was not definitively articulated by researchers (Scollon, 1974, cited in Crookes, 1990, p. 187). These findings suggested that objective and universal acoustic features like intonation contours and pauses, as well as coherence of meaning (identified from context) were useful tools that researchers could leverage as criteria to segment interlanguage speech, as well as the learner's NL and TL speech, into utterances, creating an analytical bridge to parallel utterances in all three linguistic systems. It may be important to note that scholars who proposed and applied syntax-oriented analytical units to analyze IL speech (i.e., clause, sentence, T-unit, AS-unit) still did not deny the fundamental role that intonation and pauses played in their segmentation of L2 learners' speech. In fact, Foster et al. (2000), Polio (1995) and Jin and Mak (2012) all clearly used intonation contours and pauses as criteria in their data segmentation, especially in ambiguous cases.

Crookes and Rulon's (1985) criteria for defining utterance have carried a lot of weight and been used consistently in the field. However, their system also has some limitations. First, while intonation is a reliable acoustic and perceptual feature to parse interlanguages based on intonational languages (e.g., English, Spanish), it remains to be seen if it can be equally reliable to segment interlanguages related to a tonal language (e.g. Chinese NL or Chinese TL). Second, Crookes and Rulon's (1985) conceptualization of utterance may not be suitable for parsing highly interactive conversations containing instances of co-construction, interruption, false start, repetition, and self-correction. Zhang (2002, 2004) did attempt to resolve this difficulty, offering solutions to false start, repetition, and self-correction; however, the author did not discuss how she dealt with instances of co-construction and interruption.

To summarize, among the various units researchers have used to analyze Chinese interlanguage, the utterance is the unit that best fits an interlanguage-oriented perspective (Selinker, 1972), because it focuses on meaning rather than syntax. The present study will segment Chinese-English multilingual data into utterances to facilitate quantitative analysis. Necessary adaptations and expansions of Zhang's (2002; 2004) construct of utterance will be elaborated on in the methodology section.

Summary of the Chapter

This chapter has reviewed two bodies of literature. The first half of the chapter reviewed studies investigating one-way immersion students' first and second language use. This review showed that while it is fairly clear how much L1 and L2 are used by older immersion children and why immersion students do not always use the immersion language, we have insufficient information about this topic among younger immersion learners. Claims on factors affecting older immersion children's use of the L1 vs. the L2 (i.e., interlocutor, tasks, cognitive load of academic activities) need to be further tested and expanded with a large body of data gathered from younger immersion kids. The second half of the chapter reviewed key studies that analyzed Chinese interlanguage to inform the selection of a unit of analysis to parse Chinese learner speech for quantitative analysis. The utterance was selected as the unit of analysis in this study because it best fits an interlanguage-oriented perspective.

In sum, interlocutors and tasks have been shown to be important contextual factors affecting older children's language use in immersion programs but not younger children, and little research has explored these factors quantitatively and systematically. Based on the literature review, the following two research questions will be addressed:

1. In a second-grade one-way early total Chinese immersion classroom, how much English L1 and Chinese L2 are used by focal students with various interlocutors they encounter?
2. In a second-grade one-way early total Chinese immersion classroom, how much English L1 and Chinese L2 are used by focal students while carrying out academic compared to non-academic tasks and activities?

Answers to these research questions will shed light on language use in early years of immersion programs.

Chapter 3

Methodology: Mixed-method Design

To answer these research questions, a study was developed using a mixed-method design uniquely enabling simultaneous analysis of quantitative and qualitative data, to document in detail three focal students' use of Chinese and English in a second-grade Chinese immersion classroom. This chapter describes (1) the immersion school, (2) the classroom and the teachers, (3) the researcher's role, (4) the participant selection criteria and procedure, (5) the data collection techniques, and (6) the data analysis procedures.

The Immersion School

Data were collected in a public elementary school with an early total one-way Chinese immersion program in a Midwest city in the U.S. The school's website states that the school district was among the highest performing school districts in the state and in the nation. The school district recruits non-resident students from the state's Open Enrollment program. According to its website, the school in which data were gathered was known as having a student-centered curriculum and excellent achievement in reading and math. The school offered a regular English program, and a one-way early total Chinese immersion program employing a 90/10 model. About half of the students in the school were enrolled in the Chinese immersion program and half were enrolled in the English program.

In the Chinese immersion program, all curricular instruction was in Chinese in kindergarten. During first and second grade, students began having arts, music, physical education, and media center time with specialists in English for approximately 50 minutes a day. Formal instruction began in English for approximately 60 minutes a day in

third grade and for approximately 70 minutes a day in fourth and fifth grade. Fifth grade was the end of elementary education in this Chinese immersion program. All of the Chinese immersion teachers in this program were native speakers.

The website of the state department of education reports that 65.5% of the student population of this school is White, 17.5% Asian, 12.1% two or more races, 2.8% Hispanic or Latino, 1.8% Black or African American, and 0.3% Native Hawaiian or Other Pacific Islander. 3.3% are on free/reduced-priced lunch, 3.2% are English language learners, and 11% receive special education (https://rc.education.mn.gov/#mySchool/p--3). The low percentage of students on free/reduced lunch suggests that the students are from middle to upper class families.

The Second-grade Chinese Immersion Classroom and the Teachers

There are three, second-grade Chinese immersion classrooms in this school; they are very similar in size, ethnic and linguistic diversity. The class of Ms. Teng's (a pseudonym) was chosen for data collection because I knew this teacher very well and this would allow for close collaboration. There were seventeen children in this classroom. These children came from diverse ethnic and linguistic backgrounds. Eight of the children spoke only English at home. The other nine children spoke additional languages at home, including Spanish, Chinese, Korean, a native American language, and a few languages of southeast Asia. Below is a map of Ms. Teng's classroom to help the readers understand the layout and placement of students (with pseudonyms), the teacher, and the researcher.

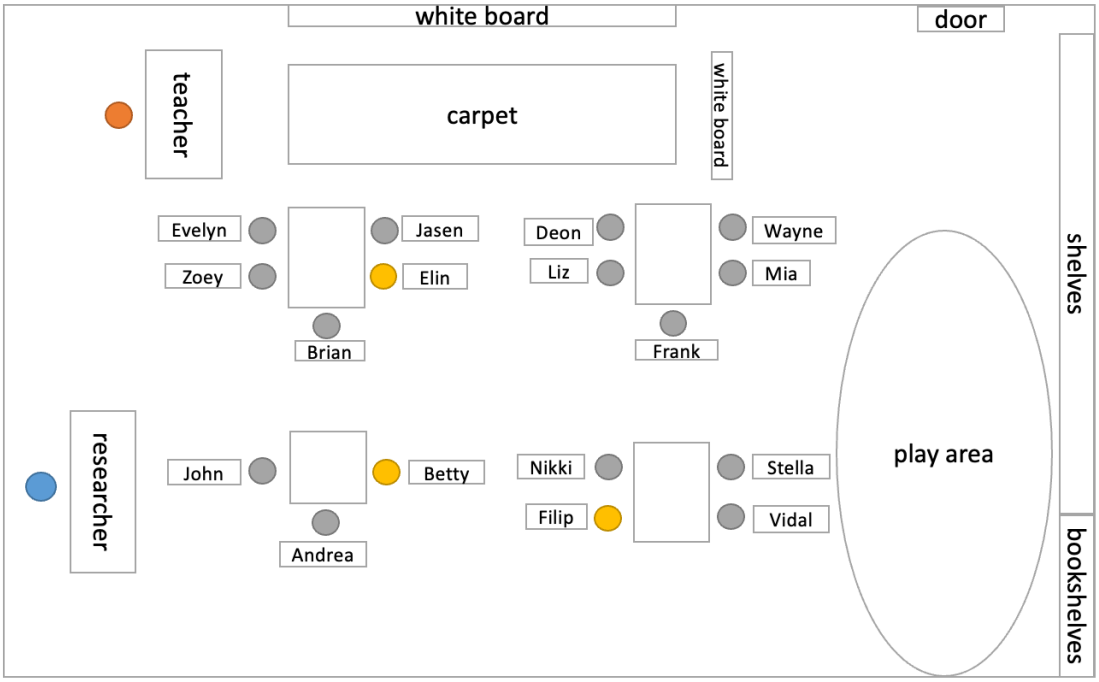


Figure 1
Map of Ms. Teng's Classroom

The homeroom teacher, Ms. Teng, was a native speaker of Chinese and an exceptionally skilled Chinese immersion teacher. She had been a Chinese immersion teacher for more than fifteen years and had been a second-grade teacher for many years. She almost always spoke to the children in Chinese in and outside of the classroom. Ms. Teng employed a student-centered approach to teaching the Chinese language and the content knowledge. She used a combination of teacher-fronted instruction, interactive activities, and desk work where children worked individually to produce written assignments. Ms. Teng was caring and supportive, and was well liked and respected by the children. She created a comfortable and lively learning environment where the children were engaged and actively participated in all kinds of classroom tasks and activities.

Ms. Teng "team-taught" this class with two other second-grade Chinese immersion teachers. She taught science in all three second grade Chinese immersion classrooms. The other two teachers, Ms. Lin and Ms. Gao, were respectively in charge of teaching social studies and health in all 3 classrooms. Taking these essential classes with different teachers exposed children to different teaching styles and gave them opportunities to learn from and interact with multiple immersion teachers.

The children moved to Ms. Lin's and Ms. Gao's classrooms to take social studies and health. Ms. Lin's and Ms. Gao's classrooms had very different atmospheres compared to Ms. Teng's classroom. This is because Ms. Lin and Ms. Gao had all the lights in the classroom covered by light blue paper, so that when the children came into the classroom they would calm down quickly. Interestingly, the children did appear to be more noisy and talkative when they came back to Ms. Teng's classroom than when they were in the other two teachers' classrooms.

The three second-grade Chinese immersion teachers had different personalities and teaching styles. The health teacher, Ms. Gao, was very organized and meticulous. Different from the homeroom teacher Ms. Teng, who created a comfortable atmosphere for children to speak out loud and to jump in whenever they had good ideas to share or questions to ask, Ms. Gao asked the children to raise their hands and to wait to be called on to answer questions. The social studies teacher, Ms. Lin, was kind and gentle. During teacher-fronted instruction, Ms. Lin delivered the lesson in a soft but sometimes monotonous voice, which contrasted with Ms. Teng's passionate way of teaching in that she frequently modulated her volume and pace of her speech to get the children's attention.

Role of the Researcher

Since I was interested in studying children's verbal interactions with their Chinese teachers and with each other during regular classroom time, I took the role of a non-participant observer. To minimize the effect of the Observer's Paradox (Labov, 1972) and to have the children get used to my presence in their classroom as a researcher, I conducted intensive classroom observations for an extended period of time (i.e., 105 hours over three weeks) before collecting audio-recorded verbal interactions of three focal children. Although I stayed in the back of the classroom and tried to minimize my interactions with the children, it was hard not to answer the children's questions or to talk to them if they initiated a conversation. In those instances, I always addressed the children in Chinese.

The homeroom teacher was my colleague from the same Ph.D. program at the University of Minnesota. By the time of data collection, I had known the homeroom teacher for more than five years and had visited her classroom and conducted many observations at different time points. By the time of data gathering, I knew the homeroom teacher's teaching style very well. I also got to know quite a few teachers in this Chinese immersion program during my visits and at local Chinese teacher conferences and gatherings. Before data collection, I did not know any of the children in this second-grade Chinese immersion classroom.

Study Participant Selection

The study participants were three English L1 second-graders, the homeroom teacher, and the other two second-grade Chinese immersion teachers.

The criteria for student selection from a pool of possible student participants from which 3 focal participants could be randomly selected were:

1. The home language of the student participant was English.
2. The student participant was talkative and gregarious; based on researcher observations and teacher descriptions.
3. The student participant had been enrolled in the Chinese immersion program at this school since kindergarten.
4. Based on teacher report, the parents of the student participant were not overly anxious about their children's participation in Chinese immersion.

In order to minimize the effect of an additional home language other than English on the acquisition of Chinese, the pool contained only children whose home language was English. Additionally, since the study focused on explicitly analyzing the focal student participants' speech in English and in Chinese, the pool was restricted to talkative and gregarious student participants who were likely to use a lot of speech, either English or Chinese, to actively participate in all class activities. The benefit of choosing talkative student participants was that it enhanced the possibility of gathering a good amount of student speech to be analyzed. On the other hand, a risk of choosing only talkative and gregarious students as study participants was that there was no representation in the pool of quiet students' acquisition of Chinese (for example, quiet students might go through a long silent period but still be learning the language by listening).

With the homeroom teacher's help, six children – four girls and two boys – were identified as meeting all the participant selection criteria. Three focal student participants were randomly chosen from this pool by the researcher, who followed this procedure:

1. Wrote the names of the 6 students on small pieces of paper.
2. Randomly chose three students from the pool by drawing papers from a container.
3. If both genders were not represented, kept selecting participants randomly until a student of opposite gender was drawn to replace the third student.

Two girls (Betty and Elin) and one boy (Filip) were chosen as focal student participants based on this random selection process. I first sent the parent consent form to the three focal student participants. After I had consent from the three focal student participants' parents, I had all the other children in this class consent because of the risk that the audio recorders might also pick up language from them. Since the three child participants would be interacting with their homeroom teacher and the other two second-grade teachers while taking health and social studies, all three second grade teachers were consented.

Description of the Three Child Participants

The following descriptions of the three focal child participants are based on my observations of them, comments by the classroom teacher, and an informal report prepared for parent-teacher conferences in which all the children identify their best friends and talk about their feelings about being in the immersion school

Filip

At the time of data collection, Filip was 9 years old and the oldest child in the second-grade Chinese immersion classroom. Filip was bright, extroverted, bossy, and extremely talkative. He demonstrated outstanding academic capacities, especially in math. He had the highest test scores in math among the three child participants. He

actively participated in all kinds of classroom activities, although he was sometimes disruptive to the teacher's instruction due to "over participation". He sometimes got bored and absent-minded during math instruction because he seemed to already know what the teacher was teaching. Filip finished his math assignments quickly, and then served as a "little teacher" or teacher's aide to help other children. Being the smartest child in the class seemed to be very important for Filip.

Filip took a leadership role in the class. He was not only observed to help other children academically, but also to help the teacher maintain discipline when children misbehaved. He had a role as the little helper of the teacher, and ran errands for her frequently. Unlike the two girls, Filip loved to talk to the teacher and the researcher. He initiated more conversations with the two adults during recess and snack time than the two girls did, sharing his life and things he did after school. During recess, if a group of children were playing together, he was usually the leader of the play activity, making decisions, setting up the rules, and telling people what to do.

In a brochure that the teacher prepared for parent-teacher conferences, Filip designated three boys as his best friends at school – Vidal, Deon, and Frank. All three boys named him back. Among the three boys Filip named, he and Vidal were the closest; the two sat together in the same small group. Vidal was gregarious and very easygoing and lenient. Filip also played together with Deon during recess. However, Deon was also among the top students in this class and was also a little bossy, so he sometimes challenged Filip. Although Filip named Frank as one of his best friends, he was not observed to hang out very much with Frank. Interestingly, Filip's self-designated friend circle did not seem to be exclusive. He was observed to play with a lot of other children

during recess, mostly boys. One boy who also played a very important role in Filip's social life at school was Wayne. Wayne was the class clown and a controversial child in the classroom in that he did not perform well academically and he did not always listen attentively to the teacher's instructions and could be disruptive of the lesson, jumping in and saying things that made the other kids laugh. Wayne was also observed to be disruptive of other children's play during recess. The relationship between Filip and Wayne can be described by the word "frenemies" – a relationship combined with friendship, competitions, disputes, and rivalry. Filip helped Wayne academically and initiated conversations with him. He was also observed to help Wayne maintain good discipline. However, Wayne did not seem to like Filip taking a "little teacher" role with him. The two boys were observed to have many disputes and conflicts. They once had a dispute outside of the classroom that resulted in both of them being pulled out in the middle of the lesson by the school counselor. Although not designating Wayne as his friend, Filip paid a lot of attention to what Wayne said and did at school.

Filip came from a middle-class family and was the second child in his family. His older sister was a graduate of the same Chinese immersion program. Filip's dad was a designer at Target. His mom was a fashion buyer. Filip's mom helped him organize his weekly assignments very well, making sure that he finished what he had to do each day. Perhaps because of his parents' occupations, Filip cared about how he looked and whether his outfit was fashionable or not.

Betty

Betty was 8 years old at the time of data collection. Although Betty did not perform as well as Filip did academically, she made steady progress during the school

year. She listened attentively during teacher-fronted instruction and participated in whole class discussions with more confidence than she reportedly had in past years. The homeroom teacher said Betty started to get serious about her learning during this school year. She finished her after school assignments on time and with very high accuracy. At school, she was observed to finish her assignments first before joining other kids and playing. When her two group members Andrea and John were off-task and chatting, Betty was observed to maintain discipline, requesting both of them to be quiet and to focus on their learning. Betty told other children that she loved learning Math.

Betty was gregarious, friendly, and talkative. She had excellent social skills and liked helping others. Thus, she developed a friendship with quite a few children in the class. In the brochure that the teacher prepared for parent-teacher conferences, Betty designated three girls as her best friends at school – Elin, Zoey, and Stella. Each of the three girls named Betty back and also designated the other two as their best friends. However, the three seemed to like Betty better and cared more about what Betty thought than the other two. All three girls wanted to do activities and play together with Betty. The girls were observed to argue and negotiate with each other about who should be together with Betty when they were starting out on academic activities. While the girls were sitting on the carpet and watching cartoons during snack time, Betty was always the one sitting in the middle. Unlike Filip and Elin, who spent a lot of time hanging out with children who they did not designate as their best friends, Betty spent most of her time doing things with her three designated best friends, especially Zoey and Stella. That said, she also hung out and played with other children during recess, especially when she had finished her assignment before her three friends had.

Betty came from a middle-class family and lived in a nice neighborhood. Her dad was a math professor and her mom was a housewife. She was the second child in her family. She had an older sister who was in the fourth grade of the same Chinese immersion program and a younger brother who hadn't started going to school yet at the time of data collection. Based on my informal conversation with the teacher, Betty's dad helped her with her learning and after school assignments, and both Betty's parents attached great importance to their children's education and academic development.

Elin

Elin was 8 years old at the time of data collection. Based on the teacher report, in past years, Elin was a top student in the class. The teacher reported that Elin demonstrated excellent reading comprehension and critical thinking skills. She actively participated in whole class discussion and contributed thoughtful comments, and finished her after-school assignments on time and with high accuracy. However, during the period of classroom observation and data collection, Elin seemed to start to change. She began to have trouble following the teacher's math instruction and grew less engaged. She seemed to have many questions about her at-school math assignments, and came to me and sought help. Additionally, Elin did not usually submit her after school assignments on time, and when she did, she seemed to have done them very perfunctorily with quite a few mistakes. The teacher reported that Elin spent many hours dancing after school, which may have taken up the time that would have been used for her after-school assignments. During my informal conversation with the teacher after data collection, the teacher reported that Elin continued to submit her assignments late during online learning sessions at home. She did not seem to care about her academic work as much as in years

past. Once when the teacher scheduled an online meeting with Elin during normal school hours to help her with her science assignment, Elin was late to the meeting and when she appeared, she seemed to just come back from playing, still with her helmet on her head.

In the brochure that the teacher prepared for parent-teacher conferences, Elin designated three girls as her best friends at school – Betty, Zoey, and Stella. Among the three girls, Elin seemed to care much more about Betty's opinion than the other two. Once I observed that when Nikki was doing a survey in the class asking everybody to choose their favorite movie between *Rack it Ralph* and *The Jungle Book*, Elin asked Nikki what Betty's choice was and then she made the same choice. Unlike Betty, who spent a lot of time during recess playing with her designated best friends, especially Zoey and Stella, Elin seemed to hang out more with Filip and his best friends than with the best friends she had named. When she was playing with Filip and his friends, she was usually a peripheral participator rather than a leader in the play. She was also observed to sit near the boys and watched them play. Elin also seemed to be really enjoying participating in games and activities such as Monkey in the Middle where a big group of children were participating. Sometimes Elin was observed to not join anyone in play during recess. In those instances, she sat by her desk and drew pictures. During data collection, there seemed to be some romance in Elin's life; in a conversation with Wayne, Elin secretly told Wayne that a mutual friend had a crush on her, and the boy literally kissed her and hugged her.

Elin came from a middle class family and lived in a nice neighborhood. Both of her parents ran small businesses. Elin was the oldest child in her family. She had a younger sister and a younger brother. In preparation of the parent-teacher conference, the

teacher asked the parents to fill out a form about their questions, things they wanted to know about their children at school, and their evaluation of their children. Elin's mom wrote that both she and Elin's dad were very proud of Elin.

Members in the Class Who Were Frequent Interlocutors with the Focal Students

Wayne

Wayne was 8 years old at the time of data collection. He was the class clown and a controversial child in the class. Wayne was extroverted and extremely talkative. He wanted other's children attention and wanted to be friends with them, but sometimes his way of making friends with other children could be a little disruptive and aggressive. He frequently said and did things that were inappropriate and made all the other children laugh, even during teacher-fronted instruction. Wayne was not a high achieving student. He did not listen attentively to the teacher-fronted instruction and did not seem to be interested in doing his assignments. He was observed to frequently play with other children without finishing his assignments first, and consequently got reminded and reprimanded by the teacher. Other children seemed to have mixed feelings about Wayne, including the three child participants. While Betty secretly complained with her group members, saying that "Wayne is a fool", and punched Wayne when he sat on her chair and refused to leave, she still seemed to enjoy playing and talking to Wayne, and she offered help when Wayne needed. Elin told on Wayne but also shared her secrets with him. Filip and Wayne were "frenemies", a relationship combined with friendship, competitions, disputes, and rivalry. Flip and Wayne played a very important role in each other's school lives. In the teacher's words, Filip wouldn't be happy without Wayne, and Wayne would lose a lot of positive energy without Filip.

Jasen

Jasen was 8 years old at the time of data collection. He was a neglected child and a social outcast in this class. He was very smart, probably the smartest child in the class. He never did his homework after school but he could still follow the teacher's instruction and give solutions to hard math problems which all the other children got stuck on. However, Jasen was very sensitive and frequently had big tantrums and burst into tears that could be scary to all the other children. Even though he was willing to help other people when they sought help from him, he was not treated as a friend by anyone.

Evelyn

Evelyn was 8 years old at the time of data collection. She was Betty's frenemy and was one of the top students in the class. Evelyn was bright, talkative, extroverted, and very bossy. Evelyn did not seem to belong to any friendship group. During recess, she played with a lot of different children, and she recruited one of the class outcasts Mia as her follower. Evelyn seemed to be interested in joining Betty's friendship clique and wanted to be friends with Betty, but perhaps because there were so many arguments and disputes between the two girls, it never worked out. Different from Filip who paid a lot of attention on his frenemy Wayne and initiated many conversations with him, Betty did not seem to care as much about Evelyn or show strong interest in hanging out with her. Betty did hang out with Evelyn when she was invited by Evelyn to play together, and although Evelyn was the organizer of the play activity, she accommodated to Betty's needs a lot.

Data Collection

Data were gathered in the following formats: (1) audio-recorded verbal interactions of the three focal student participants in the classroom, and (2) classroom observations with detailed fieldnotes.

Based on classroom observations, the classroom teacher's teaching schedule appeared to be flexible. The teacher made ongoing adjustments to the official course schedule depending on the students' level of understanding and mastery of the content. For instance, one day I observed that the teacher used some of the time designated for Chinese language arts in the afternoon to enhance students' understanding of math concepts that they had discussed in the math lesson that morning. The teacher flexibly used class time in this way to help students meet their learning objectives. Therefore, since I was not able to predict in advance the content of lessons that would be given on any given day and I wanted a good sample of a wide variety of lessons to document students' use of L1 and L2, I decided to audio-record the student participants' speech production every day, all day long for at least a week during Spring 2020. I did not collect video-recorded data because of two reasons. First, video-recording would very likely disturb classroom activities. Second, setting up the video equipment for such an extended period of time each day was not feasible in this particular classroom.

Data collection began during Spring term 2020 right after the teachers' and the student parents' approval was given. The three focal student participants were audio-recorded all day long from March 4 to March 12, 2020, except for March 5, which was devoted to parent-teacher conferences. No data were gathered after March 12, because the school district was closed the next day due to COVID-19. During data collection,

each of the three focal students was provided with a lapel microphone, a mini-Marantz audio-recorder (model PMD620), and a vertical microphone transmitter carrier belt. Data collection started from 8:30 am in the morning till the end of the school day. The three children's verbal interactions during lunchtime and in specialty classes that were not taught in Chinese (i.e., Music, PE, Art, Media) were not audio-recorded. Since the audio recorder and the mic belt were light weight and easily adjustable, the three focal children seemed to be comfortable wearing the audio-recorder for the extended period of time each day when they were in the classroom. In total, about 28 hours (6 days) of audio-recorded verbal interactions were gathered for Filip and for Betty, and about 20 hours (4.5 days) of data were gathered for Elin. Elin was recorded less than Betty and Filip because she was sick for one day and stayed home, and her audio recorder did not work for another half day. See Appendix 1 for the recording sessions and activities.

Data Analysis

To answer the two research questions, both quantitative and qualitative analyses were performed on each of the three children's verbal interactions. First, quantitative analysis using Rbrul was performed to calculate how much Chinese and English was used by each focal child and to explore the impact of interlocutor and task on their choice between the two languages. Then qualitative analysis of each focal child's verbal interactions was performed to provide contextual information for these interactions and to explore possible explanations for the quantitative patterns in the children's language choices.

The audio-recorded verbal interactions of the three focal children with different interlocutors during regular classroom time were transcribed, with the transcription

organized into numbered turns. A turn is "one or more streams of speech bounded by speech of another, usually an interlocutor" (Crookes, 1990, p. 185). Relevant contextual information from my fieldnotes was incorporated in the transcriptions in double parenthesis. See the transcription conventions used in this study in Appendix 2.

Once data collection was completed, the data were transcribed. It took the researcher six months to transcribe the three focal students' verbal interactions in the classroom. The transcription convention listed above was adapted from Broner (2001) to mark important acoustic, physiological, and interactional features of learner speech, which the researcher leveraged to understand the children's meaning and to segment utterances. For the purpose of the study, a broad transcription convention was adopted, namely a straightforward orthographic record of the words said. Transcripts of the three children's oral productions in Chinese were presented in the transcript on four lines: the first line in pinyin; the second line in Chinese characters; the third line a word-for-word English transliteration; and the fourth line an English translation. Although line 3 is not a necessity for this particular research project, it was kept in the transcript because the intention was at a later point, to examine the linguistic structure of the three focal children's Chinese interlanguage.

In instances where the quality of audio was poor, contextual information was obtained from fieldnotes and topic/content of the children's conversation to help the researcher work out what the children were saying. Cases where even contextual information couldn't help clarify the children's words and meaning were faithfully marked as unclear cases by using "(…)" or "(content)" if the content of the utterance was based on the researcher's best guess.

Unit of Analysis for Quantitative Analysis

In the present study, the utterance was used to segment the learners' transcribed speech for the purpose of quantitative analysis. The utterance functions as a semantic unit (as well as a physiological one), and thus as a valid unit for data analysis because English, Chinese, and Chinese-English interlanguage are distinct grammatical and syntactic systems that cannot be assumed to work in the same way. It is meaning rather than syntax that connects the three systems of native language, target language, and interlanguage (Selinker, 1972).

As explained earlier, Crookes and Rulon (1985, p. 9) define utterance in English as a segment in the stream of speech with at least one of the following characteristics:

(1) under one intonation contour,
(2) bounded by pauses, and
(3) constituting a single semantic unit.

Because 'intonation contour' is not a concept shared by English and Chinese, other discourse features were used, including but not limited to the acoustic clues of glottal stops, loudness, lengthening of a sound, discourse fillers (e.g., um and uh), and meaning clues provided by the context of the conversation to identify utterance boundaries in the children's Chinese interlanguage. The following section will elaborate on these criteria with examples from the study data.

In the transcript, utterance boundaries are marked by an upright slash " | ". Please refer to the transcription conventions above for the meaning of other symbols.

Intonation Contour

Intonation contours are used to segment the three children's oral language into utterances. This criterion is better applied to English than Chinese given that Chinese is

not an intonational language. However, intonation contours work every now and then in parsing children's Chinese interlanguage due to the influence of English native language transfer. So, for example, preliminary findings suggest that a rising intonation contour based on English gets transferred into the children's Chinese interlanguage. The following final intonation patterns were identified in the three focal children's spoken language:

(1) A falling intonation contour signals the end of an utterance in English if it is a statement.

1. | ok. | (Elin, 3/9/2020)
2. | stop it! | (Filip, 3/12/2020)
3. | oh my gosh! | (Elin, 3/5/2020)
4. | really wanna do it. | (Betty, 3/9/2020)
5. | I don't know if I need to do this. | (Elin, 3/5/2020)
6. | I just thought of something on all the pages I need to fix!| (Elin, 3/5/2020)

(2) A falling intonation contour signals the end of an utterance in English if it is a Wh-question.

7. | what's that one? | (Betty, 3/9/2020)
8. | why? | (Betty, 3/9/2020)

(3) A rising intonation contour signals the end of an utterance in English if it is a Yes/No question.

9. | this one↑ ? | (Betty, 3/11/2020)
10. | can I bring this one home ↑ ? | (Betty, 3/9/2020)

11. | you don't know how to write 字↑? | (Betty, 3/12/2020)

(4) A rising intonation contour signals the end of an utterance in Chinese if it is a Yes/No question. Negative transfer occurs here.

| ni zuo wan le ↑? |
12. | 你 做 完 了↑? |
| *you done ↑?* |
| *you're done ↑?* |

(Betty, 3/12/2020)

| shi san jian liu ↑? |
13. | 十 三 减 六↑? |
| *thirteen minus six↑?* |
| *thirteen minus six↑?* |

(Betty, 3/10/2020)

| ni zuo le zhe ge ma ↑? |
14. | 你 做 了 这个 吗 ↑? |
| you did this <*modal particle*>↑ *?* |
| *did you do this?* ↑| |

(Betty, 3/11/2020)

Pauses

Pause is another criterion used to identify utterance boundaries, especially in Chinese interlanguage. A pause can be an unfilled pause or a filled pause (e.g. um and uh). Based on the breath group theory (Lieberman, 1984), a pause does not have to be longer than 0.5 seconds to indicate an utterance boundary (c.f. Foster et al., 2000). It can be "unmarked" but still noticeable to human ears. 15-16 are some examples in which pauses are indicative of utterance boundaries.

15. | like I used to take those in {my-}this summer ↑, | | I would rinse them in the water and then cut off the stem↑, | and then I would {em}- (Betty, 3/12/2020)

| er shi yi jia shi jiu, |
16. | 二 十 一 加 十 九, |
| *twenty-one plus nineteen,* |
| *twenty-one plus nineteen,* |

| ni hui bian cheng san shi jia shi, |
| 你 会 变 成 三 十 加 十, |
| *you can change to thirty plus ten,* |
| *you can change it to thirty plus ten,* |

| deng yu si shi.|
| 等 于 四十. |
| *equals to forty.* |
| *equals to forty.* |

(Filip, 3/11/2020)

Although pauses can be indicative of utterance boundaries, they can also occur because of word-finding difficulties or during formulation of a complete thought, especially common in a second language. In those cases, we can't simply rely on pauses for segmentation of utterances. Other acoustic features and the context of the conversation should be applied in conjunction with pauses to parse the learners' speech. The two-second pause and the discourse filler "um" in 17 below is an example of pause signaling word-finding difficulties rather than marking an utterance boundary. Based on the context, the two-second pause in 18 below is an example of pause indicating a thought in formulation, while the (0.5) second pause with rising pitch marks an utterance boundary.

| wei en shou shi ta de (2) {um} ka pian. |
17. | 炜 恩 收 拾 他的 (2) {um}卡 片. |
| *Wayne put away his (2) {um} cards.* |
| *Wayne put away his (2) {um} cards.* |

(Betty, 3/12/2020)

| zhe ge shi bi ta:: (2) da (0.5) ↑ , | | fang zai zhe er. |
18. | 这 个 是 比 它: : (2) 大 (0.5) ↑ , | | 放 在 这儿. |
| *this is <prep> it:: (2) big (0.5) ↑ , | | put here.* |
| *this is (2) bi:gger (0.5) ↑ , | | put it here.* |

(Betty, 3/12/2020)

A Single Semantic Unit

An utterance functions as a single semantic unit. It is a chunk of language which conveys a coherence of meaning intuitively felt based on the context of the conversation (Scollon, 1974, cited in Crookes, 1990, p. 187). The analysis of the data of the present study suggests that a single semantic unit mostly dovetails with a physiological unit that is under one unified single intonational contour and usually preceded by a pause (see previous examples 1-18). However, sometimes intonation contours and pauses do not serve as a clear clue for boundaries of a single semantic unit. The following situations below illustrates the difficulties and how such difficulties were resolved.

Situation 1: The speaker's oral discourse is multiply conjoined by "metalingual markers", such as *and, but, then, if, when/while,* etc. (Brown & Yule, 1983, p. 16; Hakuta, 1976). In those cases, the streams of speech connected by "metalingual markers" are considered separate utterances. 19-20 are examples.

19. | I was about to push it over you | | when you guys said you guys were using it | | but I got it first. | (Elin, 3/12/2020)

| ni yao xie jiu, | | yin wei da an shi jiu|
20. | 你 要 写 九, | | 因 为 答案 是 九. |
| *you should write nine, | | because answer is nine.* |
| *you should write nine, | | because the answer is nine.* |

(Filip, 3/12/2020)

Situation 2: An "unmarked breath group" may contain more than one semantic unit. If a sequence of text contains full clause structure, it is an utterance, as the breath group containing two utterances in 21 illustrates.

21. | that's not fair Evelyn | | you can't just say that. | (Betty, 3/11/2020)

Situation 3: According to Brown and Yule (1983, p. 16-17), it is quite common to find what Givón (1979) called topic comment structure in spoken language, as in "*the cats + did you let them out*". The symbol "+" refers to a short pause (Brown & Yule, 1983). Similar cases, although rare, were also identified in the data of the present study, as 22 illustrates. In cases like this, the topic comment structure is considered as one utterance and one semantic unit.

| you yi ci wo de jie jie, wo men zai kan dong xi. (0.5) |
22. | 有 一 次 我 的 姐姐, 我 们 在 看 东 西. (0.5) |
| *once my older sister , we <prep> watch something. (0.5)* |
| *once my older sister , we are watching something. (0.5)* |

| {ta- na-} ta yao wo kan Barbie. |
| {她- 拿- } 她 要 我 看 Barbie. |
| *{she- take-} she want me watch Barbie.* |
| *{she- take-} she wants me to watch Barbie.* |

(Filip, 3/11/2020)

Co-construction

A thought that is **co-constructed** by two or more speakers is a complete thought and belongs to all participating speakers. Each complete thought, even when co-constructed, counts as one utterance. 23-25 are three examples.

| ye ke yi pei- (1)
23. Filip: | 也 可以 配- (1)
| *also can go with - (1)*
| *can also go with - (1)*

° ju se °.
Liz: ° 橘色 °.
° *orange* °.
° *orange* °.

ju se.
Teacher: 橘色.
orange.
orange.

ju se. |
Filip: 橘色. |
orange. |
orange. |

(1 utterance for Filip, 1 utterance for Liz, 1 utterance for the teacher) (Filip, 3/12/2020)

| mei you zai bei zi shang | ni yao - (0.5)
24. Filip: | 没 有 在 本子 上, | 你 要- (0.5)
| *not <prep> notebook on,* | *you should- (0.5)*
| *not in the notebook,* | *you should- (0.5)*

zi ji zhao yi zhao
Teacher: 自 己 找 一 找. |
yourself find. |
find by yourself. |

(2 utterances for Filip, 1 utterance for the teacher) (Filip, 3/12/2020)

| {shi^ (2) shi san::- } san fen zhi yi shi lv se de . [ji ge shi-
25. Filip: | {是^ (2) 是 三::-} 三 分 之 一 是 绿色的. [几个是-
| *{it's^ (2) it's three::-} one third is green. [how many is-*
| {it's^ (2) it's three::-} one third is green. [how many is-

| [shi lan se de! | =
Elin: | [是 蓝 色的! | =
| *[is blue!* | =
| *[is blue!* | =

= lan se de! |
Filip: = 蓝色的! |
= *blue!* |
= *blue!* |

(1 utterance for Filip, 1 utterance for Elin) (Filip and Elin, 3/11/2020)

Interruption

A complete thought that gets interrupted in the middle is still considered to be an utterance. 26 is an example. However, if a thought gets interrupted and is never finished, it is not a complete thought and not an utterance. Filip's speech in 27 below contains one utterance, and then an uncompleted thought and non-utterance.

| ni fang ni de tooth ↑-
26. Betty: | 你 放 你的 tooth↑-
| *you put your tooth↑-*
| *you put your tooth↑-*

Stella: yesterday

zai na er? |
Betty: 在哪儿？|
where? |
where? |

(1 utterance for Betty) (Betty, 3/12/2020)

|wei en! ni mei you zai wan. | wei shen me ni jue de ni- =
27. Filip: | 炜 恩!你 没 有 在 玩. | 为 什 么 你 觉 得你- =
| *Wayne! you no <prep> play.* | *why you think you-* =
| *Wayne! you are not playing.* | *why do you think you-* =

Wayne: = don't tell me then!

(1 utterance for Filip) (Filip, 3/12/2020)

False starts, repetitions, and self-corrections

False starts: False start is a stream of speech "which is begun and then either abandoned altogether or reformulated in some way". (Foster et al., 2000, p. 368). In cases where a false start (indicated by the symbol { }) is produced, the remaining part is an utterance as long as it is a complete thought, as 28-29 illustrate.

| {wo men ke yi qu^- } wo men ke yi hua zai zhe ge shang. |
28. | { 我们 可以 去^-} 我 们 可 以 画 在 这个 上. |
| *{we can go^-} we can draw <prep> this on.* |
| *{we can go^-} we can draw on this.* |

(Filip, 3/12/2020)

| {zuo-} zai zhe er zuo shen me? |
29. | {做-} 在 这 儿 做 什么？ |
| *{do-} here do what?* |
| *{do-} what to do here?* |

(Betty, 3/12/2020)

Repetitions: A repetition is where the speaker repeats previously produced speech due to disfluency (Forster et al., 2000). In cases where a repetition (demarcated by the symbol { }) is produced, as long as the remaining part is a complete thought, it is considered part of an utterance, as 30-31 illustrate.

| {wu jian::-} (2) wu jian yi deng yu si. |
30. | {五 减::} (2) 五 减 一 等 于 四. |
| *{five minus:: } (2) five minus one equal four.* |
| *{five minus::} (2) five minus one equals to four.* |

(Filip, 3/11/2020)

| hai ke yi gei ta {quan-} quan bu de ku zi. |
31. | 还 可以 给 它{全-} 全 部 的 裤子.|
| *also can give it {all-} all pants.* |
| *can also give it {all-} all the pants.* |

(Filip 3/12/2020)

Self-corrections: "A self-correction occurs when the speaker identifies an error either during or immediately following production and stops and reformulates the speech" (Forster et al., 2000, p. 368). In cases where a self-correction (demarcated below by the symbol { }) is produced, as long as the remaining part is a complete thought, the entire sequence is considered an utterance, as in 32-33 below.

| yin wei {ta zai-} ta jue de ta zai wan. |
32. | 因 为 {他 在-} 他 觉得 他 在 玩. |
| *because {he <prep>- } he think he <prep> play.* |
| *because {he's-} he thinks he's play.* |

(Filip, 3/12/2020)

| zhe ge blue shi (0.5) {um} (1) bi ta {xiao^ um} da de, | suo yi shi-
33. | 这 个 blue 是 (0.5) {um} (1) 比 它 {小^ um} 大的, | 所以 是-
| *this blue is (0.5) {um} (1) compare it {small^ um} big,* | *so it's -*
| *the blue is (0.5) {um} (1) {small^ um} bigger than it,* | *so it's –*

(Betty, 3/12/2020)

In summary, the criteria listed above worked very well in segmenting the three focal children's oral production in Chinese interlanguage and in English. Since this system was developed inductively based on the data and with all the ambiguous cases taken into consideration, it offers very clear and practical guidelines in determining utterance boundaries of the three focal children's speech.

Quantitative Analysis

Operationalization of Key Constructs in Research Questions

The present study examines the effect of interlocutor and task factors on the three focal student participants' first and second language use. Three key constructs will be operationalized in this section: (1) language choice, (2) interlocutor, and (3) task.

The language used in any given utterance can be Chinese, English, or mixed codes. If an utterance is produced in 100% Chinese or 100% English, it is considered a Chinese utterance or an English utterance respectively. If an utterance is in mix codes, it is important to determine if it is a Chinese-based code-switched utterance or an English-based code-switched utterance. Myers-Scotton (1993) referred to these as the matrix language (ML) and the embedded language (EL) in an code-switched utterance. There

are two guiding principles to determine the ML and EL of a code-switched utterance: (1) the ML provides the largest proportion of lexical items in the utterance whereas EL provides fewer items; and (2) ML sets the morpho-syntactic frame of the utterance whereas the EL does not, where morpho-syntactic frame refers to words, phrases, and syntactic structure of the utterance. Thus, if the ML of a code-switched utterance is Chinese, it is a Chinese-based code-switched utterance. On the contrary, if the ML of a code-switched utterance is English, it is an English-based code-switched utterance. 34 is an example of a Chinese-based utterance, and 35 is an example of an English-based utterance.

34. ni bu shi wo de **boss**!
你 不 是 我 的 boss！
you are not my boss!

(Filip, 3/9/2020; Chinese-based mixed code)

35. **it has to be a** zheng fang xing ↑?
it has to be a 正 方 形↑?
it has to be a square ↑?

(Betty, 3/11/2020; English-based mixed code)

Myers-Scotton's (1993) principles were helpful in coding most of the mixed-code utterances in the three focal children's speech. However, mixed codes are sometimes fuzzy in terms of whether they are Chinese-based or English-based. In those fuzzy instances, the researcher found it helpful to look at the linguistic processes that the three children seemed to engage in when producing mixed-language utterances. Data suggest two patterns. The first pattern is that the children seem to start out speaking in Chinese, but when they encounter words whose Chinese equivalence they do not know, they borrow linguistic forms from English as substitutes, as 36 shows. Instances like 36 were

coded as Chinese-based mixed-code utterances. The second pattern is that the children start out in English, but switch to Chinese to say certain words and phrases, forms that they have learned from the teacher's Chinese input and seem to have been well internalized for spontaneous use, as 37 shows. Cases like 37 were coded as English-based mixed-code utterances.

36. ni zai **just reading it!**
你在 just reading it!
you are just reading it!

(Elin, 3/4/2020; Chinese-based mixed code)

37. **how do you** xie nv sheng de pang 亻?
how do you 写 女 生 的 旁 亻?
how do you write the female radical 亻?

(Betty, 3/9/2020; English-based mixed code)

An interlocutor is defined as a particular peer; a group of peers which may include those who participate in the conversation as well as those who overhear; a teacher; the researcher; the self, and the microphone. It is important to include not only the addressees but also the overhearers as interlocutors because overhearers also affect language use of a speaker (Bell, 1984). However, it is worth noting that the quantitative analysis specifically examined only the influence of the addressees; the effect of overhearers could not be analyzed quantitatively. Qualitative analysis may mention the presence or absence of overhearers from time to time, though this will be inconsistent.

The effect of overhearers in the qualitative analysis is primarily limited to conversations within each focal student's assigned group, so the researcher is able to infer the presence of other members of the group as overhearers when they are doing group work based on her fieldnotes, even though video-recorded data were not accessible. For

example, the researcher's fieldnotes indicate that on March 9th, 2020, during morning reading, Betty was doing her math assignment in her small group with her group members, Andrea and John. In the following interaction in 38, even though Betty is only addressing Andrea, the researcher assumed John as an overhearer. In other words, although John did not say anything in this situation, the researcher assumes that his presence as an overhearer might affect Betty's language performance with Andrea.

38.

Betty **do you know what to write here?** yi yi yi ↑ ?
do you know what to write here? ——— ↑ ?
do you know what to write here ? one one one ↑ ?

Andrea that's a good question. I don't know what it is.

(Betty, 3/9/2020, writing math assignment in her small group with Andrea and John)

A task is defined as "a [goal oriented] activity which participants, themselves, must carry out" (Pica, Kanagy & Falodun, 1993, p. 12, cited in Broner, 2001, p. 36). For the purpose of this study, task was divided into three factor groups: task activity (for both academic and non-academic activities), task content (for academic tasks), and whether students are "On" or "Off" task (for academic tasks). Task activities in this second-grade Chinese immersion classroom include: teacher-fronted instruction, producing written assignments, interactive activities, drills, iPad time, snack time, recess and transitions. Among these, five are academically oriented: teacher-fronted instruction, producing written assignments, interactive activities, drills, and iPad time. Task content was defined as the overall content of each academic activity, which include: math, Chinese language arts, science, health, social studies, and coding. Each academic task had a goal and a

content that the students could either engage in, being "on-task," or not engage in, being "off-task".

The criterion used to distinguish "on-task" and "off-task" utterances is topic. If the topic of the utterance is academically related, then it is coded as an "on-task" utterance (see 39 below as an example); if the topic of the utterance is not academically related, it is coded as an "off-task" utterance (see 40 below as an example). In determining whether an utterance is on-task or off-task, the researcher pays special attention to what the children **say** rather than what they **do.** Instances repetitively appear in the data in which, while the children are physically carrying out an academic task, their conversations wander to a realm that is not task-relevant every now and then. In other words, even though the children are physically doing the task, their language use is not focused on that; such instances were coded as off-task rather than on-task utterances.

39. wo jue de shi jia fa.
我 觉 得 是 加法.
I think it's addition.

(Filip, 3/4/2020; producing written assignment; on-task)

40. you don't know when you were born?

(Betty, 3/12/2020; producing written assignment; off-task)

Like Broner (2001), ambiguous cases were identified in the present study. For instance, like Broner's kids, the focal children in the present study were observed to joke about the task they were carrying out, as we can see in 41 where Filip jokes about the task by mimicking Stella. The three focal children were also observed to make asides by talking about movies or singing a song when they were studying, as in 42 where Betty

sings Mr. Golden Sun when she is writing her math assignment. Broner (2001) clearly stated how ambiguous cases likes these were dealt with in her coding:

> if the children were carrying out the task even though they joked about it, they were considered to be On-task. If the children were carrying out a task and they made an aside (e.g. referred to a movie, a commercial, or a song, etc.) than the latter was considered Off-task. (p. 36)

The present study follows Broner's criteria. In particular, Filip's utterance in 41 is coded on-task, and Betty's utterance in 42 is coded off-task.

41.

Stella	wo ke yi yong ni de ma? wo yao::: ((making funny noises))
	我 可以 用 你的 吗？我 要:::
	can I use yours? I want it:::
Filip	ni yao::: ((mimicking Stella))
	你要:::
	you want it:::

(Filip, 3/11/2020; producing written assignment; on-task)

42. Betty sun sun Mr. golden sun ((singing))

(Betty, 3/4/2020; producing written assignment; off-task)

Additionally, there were instances in the present study where the focal children asked their peers if they could borrow their erasers. Following Broner (2001), the present study coded these utterances as "on-task" rather than "off-task", as 43 shows.

43. can I borrow one of those erasers ↑ ?

(Elin, 3/12/2020; producing written assignment; on-task)

Statistical Tools for Quantitative Analysis[3]

Rbrul

Each data set was analyzed quantitatively using Rbrul, a tool for variable rule analysis, to identify which factor(s) contributed consistently to the three student participants' recorded use of Chinese and English in the classroom.

Variable rule analysis is a specialized application of logistic regression that was first developed to analyze language variation in sociolinguistics (Sankoff, 1988). It was designed to provide a statistical model to show the probability of a situation where a speaker or a speech community selects and uses a particular linguistic variant of a linguistic variable, where the probability of choice is conditioned by a variety of contextual and/or linguistic factors (Tagliamonte, 2006; Young & Bayley, 1996). An important theoretical underpinning of variable rule analysis is that language variation is not entirely random or free, but systematic and rule-governed (Tagliamonte, 2006).

Rbrul is a variable rule program which was written by Daniel Ezra Johnson to solve problems with an earlier version called GoldVarb (or VARBRUL), the predominant variable rule program that was used in sociolinguistics for decades (Johnson, 2009). The Rbrul program is available for download at http://www.danielezrajohnson.com/rbrul.html. While Rbrul and GoldVarb use the same statistical procedure – multiple logistic regression – Rbrul has three advantages over GoldVarb that led to its use for the present study.

[3] I also explored the use of conditional inference tree with each of the three children's data to see if it offers insights that were not provided by Rbrul, but no new information was added. Thus, the conditional inference tree was not used to help me answer my research questions.

First, Rbrul can report logistic regression results, or factor effects, in both the logit scale (i.e., log-odds) and factor weights, whereas GoldVarb reports the results only in factor weights, a format that is rarely seen outside of variationist sociolinguistics (Johnson, 2009). Log-odds and factor weights have different ranges. Log-odds range from negative infinity to positive infinity (Mooney, 2018). According to Johnson (2009),

> we obtain log-odds from probabilities by taking the natural (base *e*) logarithm of the odds, where the odds are the probability of an event occurring, divided by the probability of it not occurring. The formula is ln[p/(1-p)]; a positive value is a favoring effect, a negative value disfavoring, and a value of 0 is neutral. (p. 361)

Unlike log-odds, factor weights range from 0.00 to 1.00. Preston (1996) suggests that 0.50 is a watershed such that anything over 0.50 favors rule application whereas anything under 0.50 disfavors it; Tagliamonte (2006), on the other hand, suggests that "it is the *relative* position of factor weights, vis-à-vis each other, that is the relevant criterion for interpreting the results" (p. 145). While these statements show that the "watershed" value of 0.5 in factor weight is arbitrary, the line 0 in log-odds is not arbitrary at all. The logit scale (i.e. log-odds) allows researchers to state a precise relationship between the effects of any factor with a reference level. In other words, the logit scale allows a mathematical precision that factor weights don't. For example, perhaps we would like to compare the effects of two factors A and B from the same factor group as a fixed effect in a multiple logistic regression model using treatment contrast. Factor A is designated as the reference level of that group. The coefficient (what Rbrul names as "log-odds" in its output) of A is 0, and the coefficient of B is found to be -0.892. If we wanted to know exactly how many times B hinders the rule application compared to A, we simply need to figure out the ratio of odds of B in the presence of A by taking the exponential of the coefficient of B, which

is exp (-0.892) = 0.410. Thus, the odds of rule application for B is 0.410 times as large as the odds of rule application for A. Unfortunately, factor weights do not allow us to state this kind of precise relationship between two factors. Another problem with factor weights is its distinction between "centered factor weight" and "uncentered factor weight". Researchers have differentiated themselves in their choices of centered vs. uncentered factor weight based on their personal preference and taste (c.f. Johnson, 2009; Mooney, 2018). According to Preston (personal communication, December 14, 2020), uncentered factor weight works better than centered factor weight, because some predictive power will be lost with centered factor weight. Additionally, what can be problematic about simply using factor weight to report regression results is that centered factor weight and uncentered factor weight can produce very different results. Fortunately, there is no centering or uncentering involved in log-odds, so the results do not change.

Second, Rbrul allows researchers the flexibility to choose between two coding systems – sum contrast and treatment contrast – based on their data configuration (Johnson, 2009). According to Johnson (2009), in sum contrast, each coefficient (named as "log-odds" in its output) represents a deviation from the grand mean. In treatment contrast, however, one factor in each factor group is chosen as the baseline, or the so-called reference level of that factor group, and it is given a coefficient of 0. Each of the other factors in that factor group is assigned a coefficient which represents the difference in influence in rule application between this factor and the reference. In other words, in sum contrast the effect of a factor is compared with the grand mean of the entire data set, whereas in treatment contrast the effect of a factor is compared with the reference level of

that factor group. Tagliamonte and Baayen (2012) extended the discussion on sum contrast and treatment contrast by talking about the advantages and disadvantages of both coding systems. According to them, sum contrast works well with balanced data sets because sum contrast makes it "possible to present effects as adjustments from a grand mean, which fits well with the formulation of variable rules in Cedergren and Sankoff (1974)" (Tagliamonte & Baayen, 2012, p. 152). The disadvantage of sum contrast is that the mathematical interpretation of coefficient is less straightforward for unbalanced data sets. Tagliamonte and Baayen (2012) pointed out that sum contrast "has as a consequence that the interpretation of the coefficients as differences from the group mean is only approximately correct" (p. 149). Treatment contrast, however, does not have this limitation; the coefficient is well interpretable not only for balanced data sets but also for unbalanced data sets, which is usually the case with language (Tagliamonte & Baayen, 2012). Additionally, compared to sum contrast, treatment contrast makes the associated p-value of each factor of fixed effects easy to interpret. (Please notice that Rbrul does not output the p-value of each factor of fixed effects, so we need to run a separate t-test using R to get the associated p-value) The disadvantage of treatment contrast is that the coefficient of the reference level is 0, which makes it hard to tell whether the reference level promotes or hinders rule application. However, this piece of missing information can be supplemented by telling Rbrul to output uncentered factor weight for each factor. The present study employed treatment contrast because of (1) the unbalanced data distribution in linguistic data; (2) its straightforward mathematical interpretation; and (3) the ease of interpretation of the associated p-value of each factor of fixed effects.

Third, and most importantly, Rbrul offers mixed-effects regression models. Mixed-effects models handle the problem of individual variation that is introduced to a data set produced by different speakers. According to Johnson (2009), one of the assumptions underlying regression analysis in general is that the observations in the data are independent from each other. However, this is impossible in most of sociolinguistic data sets because tokens are naturally grouped based on the different speakers who produced them (Johnson, 2009). Failure to account for the individual variation introduced to the data by different speakers will lead the program to overestimate the significance of extralinguistic effects (Johnson, 2009). On the other hand, if the individual-speaker factor group is included in the model as a fixed-effect, the program will underestimate the significance of the extralinguistic effects by eliminating them from the best run, even when they are truly significant over and above individual variation (Johnson, 2009).

The present study employs the mix-effects regression model and makes the Interlocutor factor group a random effect for different reasons (c.f. Johnson, 2009). As Preston suggests (personal communication, December 14, 2020), when there are too many factors in an independent variable, it is very likely to cause multicollinearity. Collinearity refers to cases "where two or more independent variables are correlated" (Mooney, 2018, p. 18). According to Mooney (2018), one of the assumptions of generalized linear models, including logistic regression, is that they assume the independent variables are not collinear. If the independent variables are related, it is impossible to distinguish the effect of any individual independent variable on the dependent variable. The present study encountered the problem of multicollinearity when making the Interlocutor factor group a fixed effect; the variance inflation factor (vif) then

goes over 2.5, a number that should cause for concern (Midi, Sarkar, & Rana, 2010). As this study focuses on the interlocutor effect on the three children participants' language choice, the best solution is to make the Interlocutor factor group a random effect using a mixed-effects model. In this way, a more accurate representation of the fixed effect can be obtained, along with useful information of intercepts values and factor weights of the random effect to make meaningful interpretation of inter-interlocutor variation.

Additionally, in the present study, the Interlocutor factor group is studied as a random intercept; none of the other three independent variables (i.e. Task Activity, Task Content, and On/Off Task) is added as a random slope. This is because the three-way cross-tabulation tables defined by the dependent variable (i.e. the student participants' language choice), the Interlocutor factor group, and each one of the three task dimensions (i.e. Task Activity, Task Content, and On/Off Task) did not suggest massive interaction. This means that in general each focal student's language choice followed a similar pattern across different interlocutors in a given task activity, in a given task content, or in a given situation of either being on task or being off task. The cross-tabulation results lend support for the assumption of random intercept that the effect of each of the three independent variables on a student participant's language choice is generally constant, although individual variation exists among different interlocutors. Additionally, verification of my cross-tabulation observations using Rbrul and R showed the following situations, ordered by their frequencies of occurrence during my verification: (1) a singular fit; (2) a model failed to converge; and (3) a model similar to its random intercept counterpart. Situation (1) and (2) indicated unsolvable computational problems and suggested that the random slope model is statistically problematic. The statistical

problems of a random slope model were also pointed out in Johnson (2014). In situation (3), although the random slope model does not seem to have any statistical problem, since it does not differ as much from the random intercept model, it does not worth the complication. Thus, a more complex model with random slopes was not further pursued.

It's also worth noting that since Rbrul does not output p-values for random effects, the significance of Interlocutor as a random effect was tested using a log-likelihood ratio test by comparing the log-likelihoods of models with and without Interlocutor as a random effect. If removing the Interlocutor as a random effect causes a large drop in log-likelihood, then we can say the random effect is statistically significant. Commonly we assume that a test statistic equal to twice the difference in log-likelihoods is distributed as chi-square with the degree of freedom (DF) equal to the number of additional parameters in the more complex model (the DF is 1 if testing a single random effect) (Kutner, Nachtsheim, Neter, & Li, 2005).

To sum up, Rbrul is very useful in the present study due to the following reasons. First, the nature of language use is multivariate; Rbrul takes into account all the factor groups at the same time and allows us to see the effect of one factor in the presence of all the other factors and factor groups. Second, Rbrul offers the coding system of treatment contrast, which handles the problem of the unbalanced distribution of data and which makes the mathematical interpretation straightforward. Third, and most importantly, the mixed-effects models solves the multicollinearity problem of the data.

R

Since Rbrul does not output p-value for significance test of each particular fixed-effect factor, a separate t-test was conducted using R so that the associated p-values could

be reported. The significance of each variance component of the random effect was also tested using R: if the parameter estimate is more than twice the standard error, it is likely that the estimate will be significant (Lock et al., 2013).

Coding for Rbrul

After all the linguistic and contextual variables were identified, each utterance was coded on an Excel spreadsheet. Utterances such as "oh" "uh-huh" "uh-uh" or addressing other's names (e.g., "Wayne!") were not coded and included in the quantitative analysis. Codes developed in the factor groups of "Task Content" and "Task: On/Off" were only used to code utterances that had been coded as "teacher-fronted instruction (f)", "interactive activities (i)", and "producing written assignments (w)" in the factor group of "Task Activities". Interlocutors were specifically coded as the "addressee". Below is a full list of factors and factor groups.

Dependent variable

The dependent variable was coded as

- Chinese (c)
- English (e)
- Mix <Chinese base> (m)
- Mix <English base> (x)

Independent variables

Four factor groups were considered in the analysis of the use of Chinese and English in this second-grade Chinese immersion classroom. It's worth noting that in the Interlocutor group, an interlocutor(s) could be a particular person, or it could be any combination of different people.

1. Interlocutor

    homeroom teachers (t)
    health teacher (t2)
    researcher (r)
    unknown peers (u)
    microphone (m)
    self (s)
    Betty (b)
    Filip (f)
    Elin (e)
    Zoey (z)
    Stella (o)
    Deon (d)
    Vidal (v)
    Wayne (w)
    Evelyn (y)
    Jasen (x)
    Andrea (a)
    John (j)
    Nikki (k)
    Liz (l)
    Mia (i)
    Frank (c)
    Brian (n)
    discussion groups during teacher-fronted instruction (7)
    N/A (/)

2. Task Activity

    teacher-fronted instruction (f)
    interactive activities (i)
    producing written assignments (w)
    snack time (s)
    recess (r)
    transitions (t)
    iPad time (p)
    drills (d)

3. Task Content

    Chinese language arts (c)
    math (m)
    health (h)
    science (s)

coding (d)
N/A (/)

4. Task: On/Off

ON task (o)
OFF task (f)
N/A (/)

Additional Decisions Made When Applying Rbrul

First, to avoid multicollinearity, two separate Rbrul runs were carried out for each data set, one on data collected during academic time and another on data collected during non-academic time.

Second, “iPad time” in Task Activity and “coding’ in Task Content were excluded from Rbrul analysis to avoid multicollinearity. This is because “iPad time” and “coding” were highly correlated. In other words, the same thing was studied under different labels.

Third, “drills” in Task Activity was excluded in Rbrul analysis because the purpose of language produced in drills was not to generate meaningful language use and so could not be considered “interlanguage” as defined.

Fourth, “N/A” and “unknown” in Interlocutor were excluded from Rbrul analysis, because, first, “N/A” means no interlocutor and it specifically refers to instances where the children were doing drills, and second, “unknown” was excluded due to the limitation of my research methodology (no video-recorded data). Most “unknown” utterances were produced by the three children during transitions, when they were moving from one place to the other in the classroom and at the same time also doing a quick exchange with someone on their way. “Microphone”, however, was included in the analysis because

although it did not fall into a natural category of interlocutor, Broner (2001) found it to be an indirect kind of interlocutor and exerted an impact on three child participants' language choice. In the present study, many instances were also identified when the three child participants spoke to the microphone and considered it as an indirect type of addressee.

Fifth, mixed-code utterances accounted for 6.9%, 7.4%, and 3.0% respectively in Betty's, Elin's and Filip's data set. Since these percentages are much higher than that reported by Broner (2001) (less then 2%), they were included in the quantitative analysis. The Chinese-based mixed-code utterances were combined with the Chinese utterances; the English-based mixed-code utterances were combined with the English utterances. This was done because Rbrul can only deal with binary dependent variables.

Finally, as we can see from Appendix 1, from 9:00 am to 11:40 am on 3/10/2020, the children were supervised by a substitute Chinese immersion teacher, because the homeroom teacher had to leave school to take care of some family emergency. Given that the homeroom teacher not being in the classroom might affect the children's language use with each other, their language use during these two and half hours were not included in Rbrul analysis.

Summary of the Chapter

This chapter reported in detail the processes of data collection and data analysis. Rigorous data collection and analysis techniques used a mixed-method study design. Three English L1 children were randomly selected from a second-grade Chinese immersion classroom in a one-way early total program in the U.S. Each of the three children's naturally occurring interactions with different interlocutors when they carried

out different tasks and activities in the classroom were audio-recorded every day for six almost-consecutive days for two children (Betty and Filip) and 4.5 days for one child (Elin). Their oral productions were transcribed and segmented into utterances. Each utterance was coded based on the following variables: the language in use, interlocutor, task activity, task content, and on/off task. Rbrul analyses were performed on each data set to determine which factor(s) exerted a consistent and independent effect on each of the three children's use of Chinese, during both academic and non-academic time. Qualitative analyses were then performed to shed light on the quantitative results. The study results will be reported in Chapter 4.

Chapter 4

Findings: Language Use in Ms. Teng's Classroom

The research questions for this study were:

1. In a second-grade one-way early total Chinese immersion classroom, how much English L1 and Chinese L2 are used by focal students with various interlocutors they encounter?
2. In a second-grade one-way early total Chinese immersion classroom, how much English L1 and Chinese L2 are used by focal students while carrying out academic compared to non-academic tasks and activities?

This chapter consists of three major sections. Section 1 reports the general patterns of first and second language use of the three focal children individually and as a group. Section 2 reports results that answer the first research question, namely the interlocutor effect on each of the three children's language choices between Chinese and English in the classroom. Section 3 reports results that answer the second research question, namely the task effect on each child's language use during both academic and non-academic time. The chapter concludes with major results and findings that answer both research questions. .

General Patterns of L1 (English) and L2 (Chinese) Use in the Classroom.

The findings show that overall the three children use Chinese approximately two thirds of the time and English one third of the time. Table 1 shows that as a group, the children produced 12,657 tokens, 8551 of these in Chinese (67.6%), 3426 (27.0%) in English, 516 (4.1%) as Chinese-based mixed-code utterances and 164 (1.3%) as English-

based mixed-code utterances. The table is based on 6 days of data collection for Betty and Filip, and 4.5 days of data collection for Elin.

The three children differed from one another in their overall use of L1 and L2 in the classroom. Table 1 shows the two girls, Betty and Elin, used similar percentages of L1 and L2 in the classroom. However, the boy, Filip, used proportionally more L2 than the two girls – 91.1% as compared to 52.1% and 48.5%. Elin produced less than half the tokens overall than either Betty or Filip, probably because Elin was recorded for a shorter period of time, but also because she was less talkative than Betty and Filip.

Table 1
Chinese (L2) and English (L1) tokens produced by each participant

		L2	L1	L2-based	L1-based	tot.	tot. %
Betty	N	2705	2130	225	133	5193	41.0%
	%	(52.1%)	(41.0%)	(4.3%)	(2.6%)		
Elin	N	1085	987	137	29	2238	17.7%
	%	(48.5%)	(44.1%)	(6.1%)	(1.3%)		
Filip	N	4761	309	154	2	5226	41.3%
	%	(91.1%)	(5.9%)	(3.0%)	(0%)		
Total	N	8551	3426	516	164	12657	100%
	%	(67.6%)	(27.0%)	(4.1%)	(1.3%)		

Research Question 1 – Effect of Interlocutor

Research Question 1. In a second-grade one-way early total Chinese immersion classroom, how much English L1 and Chinese L2 are used by focal students with various interlocutors they encounter?

The first research question focuses on whether interlocutor affects the three child participants' language choice of English or Chinese. An Rbrul analysis will show which interlocutors are most influential, statistically speaking, in influencing the three child participants' choice between Chinese and English.

This section presents results of both quantitative and qualitative analysis for each child participant, focusing on the impact of interlocutor on each child participant's language choice. Quantitative results for each child will precede qualitative analysis, which will provide examples of interaction. As a reminder to the reader, separate Rbrul models were built for each child participant during academic time as compared to non-academic time; this has to be done in order to avoid multicollinearity problems. Additionally, it needs to be made clear that even though Rbrul displays the significance of all the variables explored in both research questions at the same time, only the interlocutor effect in the model will be talked about in this section because it answers Research Question 1. The task effect will be discussed in detail in the next section to answer the second research question. Each child participant will be analyzed in turn starting with Betty.

Betty – Leader of Covert Resistance

The test of significance of random effects using a log-likelihood ratio test suggests that the interlocutor variable exerts a statistically significant impact on Betty's language choice during academic time. Table 2 below summarizes the output for Rbrul's mixed-effect logistic regression model of Betty's Chinese use during academic time – that is, during teacher-fronted instruction and interactive activities on health, Chinese language, math and science, and during homework time when Betty is doing written assignments mostly on Chinese language arts and math. As we can see from Table 2, the intercepts run all the way from 2.004 down to -1.562 (with positive numbers promoting Chinese and negative numbers promoting English, and the significance of each number noted in the right-hand column). The number spread means that there is a large range of

degree of influence that the interlocutor variable has on Betty's language use: different interlocutors exert different degrees of influence on Betty's use of Chinese or English.

Table 2
Rbrul's mixed-effect model for Chinese use during academic time: **Betty**

ONE-LEVEL ANALYSIS OF RESPONSE Language use WITH PREDICTOR(S): Interlocutor [random, not tested] and On/Off Task (2.74e-16) + Task Content (1.78e-15) + Task Activity (5.06e-11)					
$Task Activity					
Factor	log-odds	tokens	proportion (c/c+e)	uncentered weight	p-values
teacher-fronted instruction (f)	0.000	944	0.888	0.669	--
interactive activities (i)	-0.896	432	0.664	0.452	< 0.0001***
producing written assignment (w)	-1.069	1590	0.565	0.41	< 0.0001***
$Task Content					
Factor	log-odds	tokens	proportion (c/c+e)	uncentered weight	p-values
Health (h)	2.547	61	0.934	0.931	< 0.0001***
Chinese language arts (c)	0.000	918	0.686	0.515	--
Math (m)	-0.118	1939	0.677	0.486	0.278
Science (s)	-2.206	48	0.500	0.105	< 0.0001***
$On/Off Task					
Factor	log-odds	tokens	proportion (c/c+e)	uncentered weight	p-values
On task (o)	1.063	2594	0.715	0.533	< 0.0001***
Off task (f)	0.000	372	0.452	0.283	--
$` Interlocutor (random)					
	intercept	tokens	proportion (c/c+e)	p-values	
Standard deviation	1.047	2966	0.682		
...	...	...	...		
homeroom teacher (t)	2.004	438	0.977	< 0.0001***	
whole class (p)	1.673	39	0.949	0.0013**	
researcher (r)	1.589	18	1	0.0176*	
Mia & Vidal & Wayne (ivw)	1.103	2	1		
Filip (f)	0.801	133	0.812	0.0003***	
Brian (n)	0.577	9	0.667		
Elin & Zoey (ez)	0.457	7	0.857		
Mia (i)	0.38	15	0.733		
self (s)	0.376	518	0.834	0.0020**	
Nikki (k)	0.301	76	0.763		
children sitting near Betty during teacher-fronted instruction – Elin, Wayne, Andrea, Evelyn (7)	0.197	22	0.818		
Andrea & Wayne & Jasen (awx)	0.131	1	1		
Elin & Filip (ef)	0.119	1	1		
microphone (m)	0.083	23	0.783		
Evelyn (y)	0.066	25	0.72		

group members – Andrea & John (g (aj))	-0.068	291	0.622	
Liz (l)	-0.332	64	0.609	
Deon (d)	-0.335	4	0.5	
health teacher (t2)	-0.519	21	0.952	
Vidal (v)	-0.531	3	0	
Stella (o)	-0.592	113	0.549	0.0017**
Frank (c)	-0.601	1	0	
Wayne (w)	-0.656	42	0.643	0.0472*
Andrea (a)	-0.682	312	0.506	< 0.0001***
Andrea & Elin & Stella & Jasen (aeox)	-0.695	10	0.7	
Stella & Zoey (oz)	-0.843	4	0.75	
Elin (e)	-0.875	309	0.547	< 0.0001***
John (j)	-1.048	304	0.388	< 0.0001***
Zoey (z)	-1.285	157	0.484	< 0.0001***
Jasen (x)	-1.562	4	0	0.0346*

$misc.1

n	Df	intercept	overall proportion	uncentered input probability
2966	8	0.922	0.682	0.748

$misc.2

log-likelihood	AIC	AICc	Dxy.fixed	Dxy.total
-1511.166	3038.331	3038.38	0	0.58

R2.fixed	R2.random	R2.total
0.118	0.22	0.338

In Table 2, only interlocutors whose p-values are smaller than 0.05 exert a statistically significant effect on Betty's choice between Chinese and English; the effect of other interlocutors is not statistically significant. Using this standard, Table 2 shows that the interlocutors who significantly promote Betty's Chinese language use during academic time are the homeroom teacher, the whole class, the researcher, Filip and self. Notice that in Table 2 the homeroom teacher is at the very top; the intercept, the amount of tokens, and the proportion all show that the homeroom teacher as interlocutor promotes Betty's use of Chinese the most. The second strongest promotion of Betty's use of Chinese occurs when she addresses the whole class. When Betty is making some kind of public announcement and the audience is the whole class, her Chinese language use increases. The third strongest promoter of Betty's use of Chinese is the researcher as

interlocutor. The astute reader might have noticed that the degrees of influence of the researcher and the homeroom teacher are not the same, even though both are adults and both are native speakers of Chinese. The next interlocutor who significantly promotes Betty's Chinese use and also one with whom Betty produced a relatively large number of tokens is one peer: Filip. Notice that Filip is the only peer who significantly promotes Betty's use of Chinese during academic time. Below Filip in Table 2, there is a drop in terms of both number of tokens and amount of influence until we get to self as interlocutor – in other words, when Betty is using private speech, talking aloud to herself. Self significantly promotes Betty's use of Chinese, but is the weakest of the factors that do so.

At the bottom of the list of interlocutors in the table, we see people who, as her interlocutors, significantly promote Betty's use of English during academic time. These appear as negative numbers in the first column labeled Intercept; the strength of their promotion of English increases as we move to the bottom of the list. These individuals include Betty's best friends Stella, Elin, and Zoey. Also strong promoters of English are Betty's group members Andrea and John, and the class clown Wayne. The class outcast Jasen seldom interacts with Betty, but when he does he is a very strong promoter of English.

Table 2 shows which different interlocutors influenced Betty's use of Chinese and English during academic time. Table 3 below shows the interlocutor effect on her use of the two languages during non-academic time.

During non-academic time – that is, during transitions, recess and snack time – according to a measure of significance of random effects using a log-likelihood ratio test,

the interlocutor variable exerts a statistically significant impact on Betty's use of Chinese and English. Table 3 below summarizes the output for the Rbrul mixed-effect logistic regression model of Betty's Chinese use during non-academic time; it shows that the intercepts run all the way from 2.731 down to -1.985[4], a range that is much wider than that during academic time. This means that the degrees of influence of the interlocutor variable vary even more dramatically during non-academic time than during academic time.

Table 3
Rbrul's mixed-effect model for Chinese use during non-academic time: **Betty**

ONE-LEVEL ANALYSIS OF RESPONSE Language use WITH PREDICTOR(S): Interlocutor [random, not tested] and Activity (0.324)

$ Activity					
factor	log-odds	tokens	proportion (c/c+e)	uncentered weight	p-values
transitions (t)	0.231	301	0.525	0.55	0.165
recess (r)	0.000	1219	0.389	0.493	--
snack time (s)	-0.035	369	0.333	0.484	0.807
$` Interlocutor (random)					
	intercept	tokens	proportion (c/c+e)	p-values	
Standard deviation	1.267	1889	0.4		
...	...	...	...		
homeroom teachers (t)	2.731	58	0.983	< 0.0001***	
researcher (r)	2.44	24	1	0.0005***	
Deon & Filip & Vidal (dfv)	1.607	7	1		
Filip (f)	1.465	83	0.855	< 0.0001***	
Deon & Filip (df)	1.126	8	0.875		
Deon & Brian (dn)	0.852	2	1		
Deon & Wayne (dw)	0.716	5	0.8		
group members (g)	0.686	25	0.76		
Filip & Vidal (fv)	0.52	4	0.75		
Deon (d)	0.514	16	0.688		
microphone (m)	0.514	11	0.727		
Mia & Filip & Brian & Wayne (ifnw)	0.469	1	1		
Vidal (v)	0.45	21	0.667		
Andrea & Nikki & Liz (akl)	0.268	3	0.667		
Frank (c)	0.192	15	0.6		

[4] Positive numbers promote Chinese and negative numbers promote English, and the significance of each number is noted in the right-hand column.

whole class (p)	0.107	17	0.588	
Jasen (x)	0.044	25	0.56	
Stella & Evelyn (oy)	-0.012	15	0.533	
Wayne (w)	-0.025	95	0.547	
Nikki (k)	-0.274	39	0.487	
Liz (l)	-0.296	74	0.473	
Brian (n)	-0.501	3	0.333	
Mia (i)	-0.558	40	0.4	
Mia & Zoey (iz)	-0.618	1	0	
Elin & Zoey (ez)	-0.69	12	0.333	
Elin & Filip (ef)	-0.692	1	0	
Elin (e)	-0.696	205	0.395	< 0.0001***
Stella & Zoey (oz)	-0.719	15	0.333	
Andrea (a)	-0.767	25	0.36	
Stella (o)	-0.785	367	0.351	< 0.0001***
Mia & Evelyn (iy)	-0.99	2	0	
self (s)	-1.199	54	0.259	0.0001***
Evelyn (y)	-1.27	108	0.25	< 0.0001***
John (j)	-1.555	23	0.174	0.0010**
Zoey (z)	-1.664	476	0.185	< 0.0001***
Elin & Stella & Zoey (eoz)	-1.985	9	0	0.0099**

$misc.1

n	df	Intercept	overall proportion	uncentered input probability
1889	4	0.183	0.4	0.553

$misc.2

log-likelihood	AIC	AICc	Dxy.fixed	Dxy.total
-1108.796	2225.591	2225.613	0	0.483

R2.fixed	R2.random	R2.total
0.002	0.327	0.329

In Table 3, only interlocutors whose p-values are smaller than 0.05 exert a statistically significant effect on Betty's choice of Chinese or English during non-academic time. Using this standard, only three interlocutors significantly promote Betty's use of Chinese during non-academic time. They are the homeroom teacher, the researcher, and Filip. Notice that the homeroom teacher is still at the very top of the list of interlocutors, indicating that the homeroom teacher as interlocutor most strongly promotes Betty's use of Chinese during non-academic time. Following the homeroom teacher, the researcher as interlocutor is the second strongest promoter of Betty's use of

Chinese in the non-academic setting. Filip, surprisingly, appears again, now as the only peer who significantly promotes Betty's use of Chinese during non-academic time.

At the bottom of the list of interlocutors are a group of children who, when they are her interlocutors, significantly promote Betty's use of English during non-academic time. These children are more or less the same as those identified as significantly promoting Betty's use of English during academic time. They are Betty's best friends Stella, Elin, and Zoey, either alone or as a group, Betty's frenemy Evelyn, and one of Betty's group members John. Notice that Betty produces many more tokens with her best friends than with other children, but the percentages of Chinese that Betty produces with them are quite low. It may be important to note that whereas self significantly promotes Chinese during academic time, self significantly promotes English during non-academic time; that is, during non-academic time Betty's private speech is significantly likely to occur in English. This use includes a lot of vernacular words/phrases in English (e.g. *oh my gosh! what?!*).

Taken Tables 2 and 3 together, the teacher and the researcher significantly promote Betty's use of Chinese during both academic and non-academic time. Interestingly, Filip is the only peer who strongly promotes Betty's Chinese language use in both the academic and non-academic contexts, whereas children who Betty has a close relationship with, especially her best friends, strongly promote her use of English in both contexts. The quantitative data cannot tell us why Filip is the only peer who strongly promotes Betty's use of Chinese whereas all the other peers she has a close relationship with strongly promote her use of English. In order to better understand the dynamics of these overall patterns in Betty's use of Chinese and English in oral interaction, in the next

section we will examine specific transcript segments documenting her interactions with these interlocutors.

Betty's Interactions with the Homeroom Teacher

Table 2 and Table 3 above show that the homeroom teacher significantly promotes Betty's use of Chinese in both academic and non-academic settings. Results of qualitative analysis presented in this section suggest that Betty primarily uses Chinese with the homeroom teacher in at least two situations: in academic time, answering the teacher's questions during teacher-fronted instruction, and in non-academic time, asking for permission to do things. Examples 1 and 2 illustrate Betty's language use with the homeroom teacher in these two situations.

Example 1. 3/9/2020. Content: Math. Context: Teacher-fronted instruction. Topic: *Talking about word problems in Math Box.*

1. T	hao, yi fen qian shi wu fen zhi:: [yi. 好，一 分 钱 是 五 分 之:: [一. *ok, one cent is one:: [fifth.*	
2. Betty		[yi. [一. [*one.*
3. T	liang fen qian ne? 两 分 钱 呢? *how about two cents?*	
4. Betty	[wu fen zhi:: er. [五 分 之:: 二. [*two fifths.*	
5. Ss	[wu fen zhi:: er. [五 分 之:: 二. [*two fifths.*	

Example 2. 3/5/2020. Context: Snack time.

1. Betty Teng lao shi ke yi kan le ma?
滕 老 师, 可以 看 了 吗?
Ms. Teng, can we watch the cartoon now?

2. Teacher hao.
好.
ok.

Betty speaks English to the homeroom teacher very rarely. When she does, it is generally in the following two circumstances: (1) saying a word or a chunk whose Chinese equivalent she doesn't know or cannot come up with at the moment of speaking, shown in Example 3 below, and (2) making cross linguistic identification during teacher-fronted instruction, as in Example 4 below.

In Example 3, in non-academic time, the children are kicking jianzi in small groups during recess. Jianzi is a traditional sport in China in which people aim to keep a heavily weighted shuttlecock in the air with their body, without using their hands and arms. The jianzi which Liz and her friends are kicking gets broken, and plastic discs fly away and some drop near Betty. Then Betty lets the teacher know the situation using a mixed-code utterance, where the morpho-syntactic structure of the utterance is Chinese. Note that this is not a direct translation from English; the particle 了(le) which is documented in the literature to pose challenges for learning (e.g. Wen, 1995, 1997), is used correctly by Betty.

Example 3. 3/9/2020. Context: Recess.

Betty {ta me-} zhe ge **break** le teng lao shi!
{他们-} 这 个 break 了 滕 老师!
{*they*-} *this is broken Ms. Teng!*

Betty's second type of use of English with her classroom teacher is shown in Example 4; during Chinese language arts in academic time, the teacher is asking the children to share the names of different pets they know. Based on the students' previous English contributions of "bird", the teacher is introducing the Chinese word for parrot to the students. Once she hears the teacher's description in lines 1-2, Betty in line 3 makes a cross-linguistic identification by saying parrot in English. In this example, Betty's use of English is permitted by the teacher because the Chinese name of parrot is a new vocabulary word for the children, and saying it in English suggests Betty's comprehension of the teacher's instruction.

Example 4. 3/9/2020. Content: Chinese language arts. Context: Teacher-fronted instruction. Topic: *What pet do you want to have?*

1. T	niao zhong jian you yi zhong, ren men zui xi huan yang yi zhong niao, 鸟 中 间 有 一 种, 人 们 最 喜 欢 养 一 种 鸟, *there is one kind of bird, a kind of bird that people like to raise the most,*
2.	ta hui gen zhe ni shuo hua. 它 会 跟 着 你 说 话. *it can mimic.*
3. Betty	dui! **parrot!** 对! parrot! *right! parrot!*

In general, Betty is not observed to frequently initiate or carry on extensive conversations in Chinese with the homeroom teacher during either academic or non-academic time. When she talks to the teacher, she talks in a succinct manner.

Betty's Interactions with the Researcher

The researcher also significantly promotes Betty's use of Chinese. Interactions with her generally happen when Betty asks for permission to do things. Betty is not

observed to carry on extensive conversations in Chinese with the researcher either. In Example 5, Betty asks the researcher if she can use the restroom.

Example 5. 3/5/2020. Context: Recess.

1. Betty wo ke yi qu ce suo ma?
   我 可以 去 厕所 吗？
   can I use the restroom?

2. Researcher qu ba.
   去吧.
   sure.

Betty rarely speaks to the researcher in code-switched utterances. When she does, it is usually when she does not know a Chinese equivalence. In Example 6, Betty and one of her best friends Zoey are making a small illustration book in English during recess. The two girls want to write "the emoji world" on the cover of their book. However, neither of them knows how to write "emoji" in English, so they come and ask the researcher, with their illustration book and a pencil in hand.

Example 6. 3/9/2020. Context: Recess.

1. Betty [zen me xie **emoji**?
   [怎 么 写 emoji?
   [*how to write emoji?*

2. Zoey [zen me xie **emoji**?
   [怎 么 写 emoji?
   [*how to write emoji?*

3. Researcher ni shi shuo ying wen ma?
   你 是 说 英 文 吗?
   do you mean how to write it in English?
   ((the two girls nodding; researcher writing "emoji" in English on the cover of their book))

In lines 1 and 2, Betty and Zoey ask the researcher together how to write emoji in a Chinese-based utterance. The two girls start out in Chinese but switch to English to say

"emoji", whose spelling they are interested in knowing. The researcher, in line 3, confirms with the two girls that it is the English word that they want to know and writes it down on the cover of their book.

Betty's Self as Interlocutor (Betty's Private Speech)

Table 2 and Table 3 above show that *self* as Betty's interlocutor (referred to by Lantolf 1997 as *private speech*) exerts a statistically significant effect on her language choice in two opposite directions, depending on whether it is academic or non-academic time. When Betty speaks to herself out loud during academic time, her use of Chinese is significantly promoted, as we see in Examples 7-11 below; Example 12 is presented as a rare exception. On the other hand, when Betty speaks to herself during non-academic time, she shows a significant preference for an English style filled with vernacular words/phrases (e.g. *oh my gosh! what?!*), as in Example 13 below.

Of the 3 participants, Betty produces the largest amount of private speech, and she does so primarily in Chinese in a variety of situations during academic time. First, Betty is observed to frequently use private speech in a covert way in a very soft voice to answer the teacher's questions directed either to the whole class or to another single student. In Example 7, lines 2 and 4, Betty tells herself the answer to the homeroom teacher's question addressed to the whole class during Math instruction.

Example 7. 3/11/2020. Content: Math. Context: Teacher-fronted instruction. Topic: *Word problems on fraction.*

1. T	ji zhu, liang ge ren zen me suan chu lai de a? si. 记 住，两 个 人 怎 么 算 出 来 的 啊？四. *remember, two people, how was it calculated? four.*
2. Betty	°° si °° °° 四 °°

°° *four* °°

3. T yin wei mei ge ren chi ji kuai?
因 为 每 个 人 吃 几 块？
because how many pieces does each person eat?

4. Betty °° er °°
°° 二 °°
°° *two* °°

In Example 8, during teacher-fronted instruction Betty is observed to spontaneously and covertly repeat after the teacher and other students in Chinese. In Example 8, the homeroom teacher is talking about the concept of permutations and combinations. In order to help the children understand the concepts, the teacher draws three short-sleeve shirts and three pairs of pants on the whiteboard, and then writes a character in a different color below every item of clothing. Since the word "orange" in Chinese is not a word that the students are as familiar with as the other color words (red, green and yellow), the teacher, while writing the characters on the whiteboard, tells the students what "orange" means in lines 1, 2, and 3. It seems that the Chinese word "orange" is still a new word to Betty, as she repeats it covertly in line 4. As we can see from this example, Betty's repetition is not produced upon the teacher's request. Rather her repetition is spontaneous private speech, apparently (as Lantolf 1997 has argued) as language play for the purpose of rehearsal and self-regulation, to help herself accurately produce Chinese words.

Example 8. 3/12/2020. Content: Math. Context: Teacher-fronted instruction. Topic: *Permutations and combinations*

1. T san tiao ku zi,
三 条 裤子，
we've got three pairs of pants,

2. hei se (5) huang se (5) he:: cheng se, ((teacher writing on board))
黑 色 黄 色 和:: 橙 色，
Black yellow and:: orange,

3. cheng se jiu shi ju se dui ba?
橙 色 就是 橘色 对吧？
the color of orange is the color of clementine right?

4. Betty °° cheng se °°
°° 橙 色°°
°° *orange* °°

In other situations, Betty's covert repetition in Chinese appears to serve the function of ludic language play, as she mimics the speaker covertly to herself for entertainment. In Example 9, Betty is mimicking the homeroom teacher in this way during teacher-fronted instruction in Chinese language arts. The class is talking about what they can do in Chinese after learning Chinese for two years and a half. The teacher repeats Elin's answer while she is writing it down on the white board in line 3. Betty, who seems to find the rhythm of the teacher's repetition very interesting, covertly mimics, or "mirrors" the teacher's rhythm in line 4, with a pattern of pronunciation and prosody that is very similar to that of the teacher. Possibly she may be role-playing *being* her classroom teacher (LaScotte & Tarone, 2019). The purpose of her language play here is clearly not rehearsal, since she already knows and doesn't need to learn or practice the word *du shu*; rather it appears to be ludic play with the prosody attached to the entire phrase "ok, reading, ok, reading, ok, reading." that she apparently enjoys saying to herself.

Example 9. 3/4/2020. Content: Chinese language arts. Context: Teacher-fronted instruction. Topic: *Review.*

1. T hai you ne?
还 有 呢?

what else?

2. Elin {du-} du shu!
{读-} 读 书!
{*re-*} *reading!*

3. T du shu, hao, du shu, hao, du shu. ((writing on white board))
读 书. 好, 读 书. 好, 读 书.
reading. ok, reading. ok, reading.

4. Betty °° hao, du shu. hao, du shu. hao, du shu. °°
°° 好, 读 书. 好, 读 书. 好, 读 书 . °°
°° *ok, reading. ok, reading. ok, reading.* °°

Examples 7, 8, and 9 above show how Betty's private speech in Chinese both as rehearsal and as ludic play, offers her many opportunities to learn both content knowledge and relevant Chinese language forms. Although Betty is clearly not trying to get the teacher's attention in speaking softly to herself, these instances of quiet private speech in peripheral participation seem to show that Betty is listening attentively to the teacher and trying to rehearse and learn both the content of instruction and related Chinese language forms. Indeed, Betty's Chinese pronunciation and use of grammar appear to be the most accurate of the three child participants. Although this cannot be statistically verified, Betty's frequent repetition in private speech and her vicarious responses in Chinese support Lantolf's (1997) claim that private speech can improve second language learning.

Finally, private speech in Chinese for the purpose of self-regulation occurs during academic time when Betty is doing her written assignments. She reads out loud to herself the reading comprehension questions and the math problems she is working on, and she murmurs to herself the character/word she is writing. In Example 10, Betty is making up a sentence in Chinese with the following structure provided by the teacher: "if I had a

name of pet, I am going to *things you will do to take care of the pet*." Example 10 shows while Betty is writing her sentence, she murmurs to herself in Chinese to self-regulate her performance and learning of Chinese writing (Lantolf, 1997).

Example 10. 3/9/2020. Content: Chinese language arts. Context: Producing written assignment.

Betty	°° wo hui (1) wo hui (0.5) gei ta chi dong xi. °° °° 我 会 (1) 我 会 (0.5) 给:: 它 吃 东 西. °° °° *I will (1) I will (0.5) feed it.* °° ((writing and murmuring to herself))

During academic time, whenever she is solving math problems, Betty is observed to speak to herself to regulate her thinking; this occurs mostly in Chinese, although sometimes her self-regulation is in English. The choice of language that Betty uses in the examples below to help her regulate her thinking may relate to the cognitive load of the math problem she is working on (Swain & Lapkin, 1998). A heavier cognitive load of math may promote more use of the first language than the second language. Let's look at two examples.

In Example 11, Betty speaks to herself in Chinese while she is processing the teacher's question during math instruction. The teacher is talking about the concept of area. In the transcript, the teacher is asking the children to figure out how many grids are there on the carpet they are sitting on. As we can see in lines 5, 7, 9, and 11, Betty is talking to herself in a very soft voice in Chinese while she is doing the counting and calculation. The cognitive load of this task does not seem to be particularly heavy for Betty and all the other children because the teacher's question is very contextualized and everybody has a great visual support to help them in their processing – the carpet.

Example 11. 3/5/2020. Content: Math. Context: Teacher-fronted instruction. Topic: *Word problems in Math Box.*

1. T	na wo qing yi ge xiao peng you gao su wo zhe di tan de mian ji shi duo shao. 那 我 请 一个 小 朋 友 告 诉 我 这 地毯 的 面 积 是 多少. *ok, I am going to invite one of you to tell me what is the area of the carpet.*
2.	mian shi zhi ta de lian, zhe di tan de lian yi gong you duo shao? 面 是 指它的 脸，这 地毯 的 脸 一 共 有 多 少？ *area means its face, how big is the face of the carpet?*
3. Filip	zhi dao! 知 道！ *I know!*
4. Wayne	[shi liu! [十 六！ [*sixteen!*
5. Betty	[°° shi er °° [°° 十二 °° [°° *twelve* °°
6. Filip	[shi ba! [十八！ [*eighteen!*
7. Betty	[°° shi er jia shi er deng yu er shi si °° [°° 十二 加 十二 等 于 二十四 °° [°° *twelve plus twelve equals to twenty four* °°
8. T	bu xu shuo hua. 不 许 说 话. *don't talk.* ((teacher addressing Filip and Wayne who shouted out wrong answers without careful thinking))
9. Betty	°° er shi wu, er shi liu, er shi qi °° °° 二十五， 二十六， 二十七 °° °° *twenty-five, twenty-six, twenty-seven* °°
10. Filip	san shi! 三十！

thirty!

11. Betty °° er shi ba, er shi jiu °°
°° 二十八， 二十九 °°
°° *twenty-eight, twenty-nine* °°

12. san shi!
三十！
thirty!

In comparison, the math problems presented in Figure 2 below are much harder. In Example 12, Betty speaks to herself in English in private speech to regulate her work using the information in Figure 2. In Example 12, Betty is working on the sums when different numbers are added to 19. Betty first breaks 19 down into a 10 and a 9, and then she adds the 10 to the number first and then counts up to the 9; this is a strategy that the teacher has introduced in previous lessons to help the students simplify this type of math problem. However, the operation of counting up the additional 9 still seems to be challenging for Betty, because she resorts to counting in English.

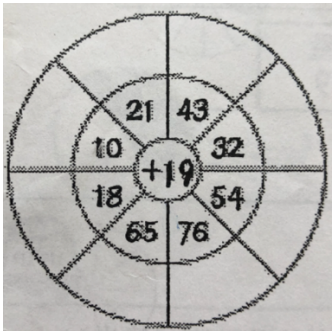


Figure 2
The math problem Betty is working on in Example 12

Example 12. 3/11/2020. Content: Math. Context: Writing assignments at table.

Betty °°° seventy-five, seventy-seven, seventy-eight °°°(9)
((working on 65+19))
°°° oh my gosh °°°
°°° eighty-six, eighty-seven, eighty-eight, eighty-nine °°°(5)
((working on 76+19))

°°° sixty-four, sixty-five, sixty-six, sixty-seven, sixty-eight, sixty-nine °°°
((working on 54+19))

While the *self* as interlocutor significantly promotes Betty's use of Chinese during academic time, the opposite occurs during non-academic time; then Betty's private speech switches to English, and includes many vernacular words and phrases. The most frequent vernacular terms produced by Betty include *oh my gosh*, *oh my god*, *what?!*, *whoops*, *yes!*, and *yeah*. In Example 13 below, Betty and one of her best friends Stella are reading a catalogue for American Girl dolls. The two girls look at the pictures of the dolls and quickly point to and verbally identify the ones they like. In line 1, Betty does this in English, first addressing Stella and then in private speech using two vernacular terms: *what* and *oh my god.* Betty's pitch shifts when she moves from addressing her friend to addressing herself. There is a narrower pitch range for *I like her,* when Betty is talking to Stella, and a wider and higher pitch range for *what?! oh my god!*, when Betty is talking to herself.

Example 13. 3/4/2020. Context: Recess; Betty and Stella reading an American Girl doll catalogue.

1. Betty I like her. what?! oh my god!

2. @T hao le a! lai ba!
好 了啊！ 来吧！
ok! come here!
((asking children to come to the carpet to get ready for class))

Betty's Interactions with Peers

Although Betty interacted with many children during data collection, Rbrul results show only a few child interlocutors exert a statistically significant impact on her language choice. Filip is the only peer who significantly promotes Betty's use of Chinese,

whereas all the other children significantly promote her use of English; this pattern holds regardless of whether it is academic or non-academic time.

Filip's significant promotion of Betty's use of Chinese seems to be partially explained by his leadership role in the class. As the leader of the class, Filip is observed to frequently play a role as a "little teacher", helping the teacher maintain discipline and helping other children with their assignments. For example, Filip is observed to periodically warn Betty when he hears her speaking English. (Interestingly, none of the other children that Betty interacts with are ever observed to comment on or monitor Betty's language use.) In Example 14 below, Filip and Betty are talking about the art crafts they will display at the imagination fair later during that day.

Example 14. 3/9/2020. Content: Chinese language arts. Context: Morning reading; producing written assignments.

1. Filip	ni men zuo yi ge dong wu yuan. 你 们 做 一 个 动 物 园. *you guys made a zoo.*
2. Betty	bu, wo men zuo yi ge (2) **(virtual) zoo.** 不，我 们 做 一个 (2) (virtual) zoo. *no, we made a (2) (virtual) zoo.*
3. Filip	uh↑?
4. Betty	you'll see it later.
5. Filip	hao hao, ni shuo ying wen you yi dian. 好 好，你 说 英 文 有 一点. *ok ok, you spoke English a little bit.*
6. Betty	{ni-} zhe ge hen nan:: (2) shuo, {suo yi wo-} **you'll** kan dao ° ta de °. {你-} 这 个 很 难:: (2) 说， {所 以 我- }you'll 看 到 ° 它的 °. {*you-*}*this is very hard::* (2) *to say,* {*so I-*} *you'll see ° it later °.*

After Filip hears Betty speaking English in line 4, in line 5, he says “ok ok you spoke English a little bit”. In the very next turn, in line 6, Betty switches right back to Chinese with “this is very hard to say”.

In other instances, Betty is observed to switch to Chinese to talk to Filip whenever he gets near while walking around the classroom and checking on other children’s assignments (while holding a red pen in his hand!). This differs from her language use with other peers. We see this clearly in Example 15; although Betty uses English when asking her peer group members John and Andrea for help in lines 1, 3, and 5, she switches to Chinese in line 7 to ask Filip for help when she sees him approaching, and their interaction in lines 8 through 11 remains in Chinese.

Example 15. 3/11/2020. Content: Math. Context: Producing written assignments.

1. Betty	this one. can you help with this? can you help with this? can you help with this? can you help with this?
2. John	yeah.
3. Betty	what’s the difference?
4. Andrea	this.
5. Betty	ok. what is `the difference?
6. John	I (….) to be. ((Filip coming))
7. Betty	bang wo 帮 我！ *help me!*
8. Filip	hao! 好！ *ok!*
9. Betty	zhe ge shi dui ma? 这 个 是 对吗？(3)

is this right?

10. Filip dui.
对.
right.

11. Betty ke yi da gou gou. zhe ge dui, zhe ge dui, zhe ge dui, zhe ge dui, zhe ge dui.
可以 打 勾 勾. 这 个对, 这 个 对,这 个 对,这 个对, 这 个 对.
you can write a checkmark. this is right, this is right, this is right, this is right, this is right.

Examples 14 and 15 above suggest that Filip's role as a "little teacher" might be a possible reason why he strongly promotes Betty's use of Chinese during academic time. His behaviors of periodically warning Betty on her use of English and usually acting like a teacher seem to serve as constant reminders that Betty should speak Chinese, and she does.

Another possible reason why Betty speaks a lot of Chinese with Filip during academic time could be that when these two work together, they seem to be always on task and rarely have any extensive interaction around anything other than schoolwork. This is perhaps because even though Betty has a good relationship with Filip, they are not each other's best friends. Thus, their purely academic relationship seems to constrain their range of conversation topics. Example 16 is an example of this kind of interaction; Betty and Filip are attentively checking each other's assignments upon the teacher's request during academic time.

Example 16. 3/10/2020. Content: Math. Context: Checking assignments in pairs.

1. Filip [shi er, ling.
[十二，零.
[*twelve, zero.*

2. Betty [shi er, ling. (2) ((moving to the next page)
[十二，零.

[*twelve, zero.*

3. Filip dui.
对.
correct..

4. Betty **wait,** zhe ge yao quan qi lai↑?
wait, 这 个 要 圈 起来↑?
wait, should we circle this↑?

5. Filip bu yao.
不 要.
no.

6. Betty ni quan qi lai.
你 圈 起来.
you circled it.

7. Filip {wo-} wo ca diao.
{我-} 我 擦 掉.
{*I-*} *I erased.*

8. Betty hao.
好.
ok.

In lines 1 and 2, they are checking their answers by reading them out loud in Chinese. In line 4, Betty notices that Filip circles a place on his notebook where she doesn't, so she says in English "wait" and then in Chinese asks Filip if that place should be circled or not. In lines 5 through 8 they argue in Chinese about whether Filip did or didn't make the circle there. As we can see from Example 16, both children are completely focused on the academic task and both rely on Chinese to talk to each other.

Betty's language use with Filip is very different with her other peers even in similar situations; when she is working together with her best friends during academic time, there is a significant tendency for that discourse to occur more in English. In Example 17, the three best friends – Betty, Elin and Zoey – are sitting on the carpet and

doing their Chinese assignment together. The teacher asks the children to make up a sentence in Chinese with the following structure "if I had a *name of pet*, I am going to *things I will do to take care of my pet*." After they decide what pet they are going to write about, the three girls start to make up their own sentences. While writing, Betty and Zoey have a mixed language conversation, switching from English to Chinese and back to English, about the gender of their pets and which pronoun should be used. (In Chinese, the sound *ta* refers to both the male pronoun and the female pronoun but the characters are different.)

Example 17. 3/9/2020. Content: Chinese language arts. Context: Writing assignments with friends.

1. Betty	**I am gonna do a** nv sheng de ↑, **I am gonna do a** nv sheng de↑. I am gonna do a 女 生 的↑, I am gonna do a 女 生 的↑. *I am gonna do a girl's ↑, I am gonna do a girl's ↑.*
2. Zoey	**I am gonna do a** nan. I am gonna do a 男. *I am gonna do a boy.*
3. Betty	really↑?
4. Zoey	what！(2)
5. Betty	ok! (2) 'cause then it can have babies.
6.	**I'll do** nv, **'cause then it can have babies.** I'll do 女, 'cause then it can have babies. *I'll do girl, 'cause then it can have babies.*
7.	ni yao gei (0.5) `ta. 你 要 给 (0.5)`他. *you need to give (0.5) `him.* ((reading Zoey's sentence; noticing that Zoey wrote a male pronoun))
8. Zoey	ok.

9. Betty **so** shi na ge nan sheng de ta, gei ta.
so 是 那 个男 生 的 他,给他.
so it's the boy he, give him.

10. Zoey **ok! I'll do** nv. (1)
ok! I'll do 女. (1)
ok! I'll do girl. (1)

11. Betty because then it will have babies Zoey↑.

12. Zoey then I can name one of them a boy name.

In line 1, Betty says in English that she is going to write the female pronoun 她/*ta* (she) for her bunny, and in lines 5 and 6 she adds in English because then her bunny can have babies. In line 2, Zoey tells Betty in English that she is going to write the male pronoun 他/*ta* (he) for her kitty, and in line 7 Betty sees that Zoey writes the male character, so she reads aloud Zoey's Chinese sentence and switches to Chinese in line 9, to say that Zoey wrote down the male pronoun. In line 10, Zoey goes back to English to say she will do what Betty wants her to and use the female pronoun 她/*ta* (she), and in line 11 Betty uses English to register her approval because, she says, then her kitty can have babies too. Zoey agrees but insists that she can name one of her female kitty's babies a boy name. As we can see from Example 16, the two girls' discussion and negotiation about the gender of their pets is primarily in English and in English-based mixed-code utterances.

Even when the children move into non-academic contexts, quantitative analysis shows Filip as interlocutor continues to significantly promote Betty's use of Chinese. When Betty does play with Filip, she is observed to speak a lot of Chinese, although she does not spend a lot of time playing with Filip compared to with her best friends. It is

important that the type of activities Betty does with Filip and Filip's friends are very different from the activities she does with her best friends. In general, Filip's non-academic activities do not have an in-group/out-group characteristic and they tend to engage all of the children who participate in them in the use of Chinese. The non-academic activities that Filip engages in involve a lot of construction tasks, physical movements, and competitions. For instance, Filip does a lot of building work with toy blocks with his friends, and then they use chess pieces of different colors to represent soldiers from two armies and make them fight against each other. These games and activities are usually very lively and attract many other children to join or to observe. These activities that Filip is doing during recess do not seem to be exclusive to a certain group of children; rather, anyone who seems to be interested can participate fully or peripherally in the middle of play, and anyone who feels bored is free to leave. Filip is usually the leader or one of the leaders, setting up rules and dominating the play. As the leader of this kind of play, Filip spoke loudly in Chinese, getting people's attention and telling people what to do. Perhaps because Filip is the leader who always speaks Chinese, and perhaps because these activities are sort of "open to the public", the children (including Betty) who join in this kind of play are observed to speak a lot of Chinese too.

In Example 18, Betty joins Filip and his friends in the middle of this kind of play during recess. Before the conversation in Example 18, Filip and two of his best friends Deon and Vidal have been building a bowling alley with toy blocks at the corner of the classroom. They make the chess pieces the pins and the table tennis ball the bowling ball. After the bowling alley is built, they try it out by rolling or throwing the table tennis ball at the chess pieces placed at the end of the alley. Elin and Jasen are observing quietly.

Filip, Deon and Vidal are using Chinese to speak to each other. Betty, who seems to find the play to be very interesting, comes and joins the play with one of her best friends, Stella. While Betty has been speaking to Stella in English, she switches from English to Chinese as soon as she talks to Filip and his friends as she joins the play. As we can see from Example 18, Betty speaks in Chinese almost exclusively during the activity.

Example 18. 3/4/2020. Context: Recess.

1. Deon	wo men zuo yi ge bi sai hao ma? (3) 我 们 做 一个 比赛 好 吗? *let's do a competition ok?*	
2. Betty	ni zai zuo shen me ?! (3) kuai! (1) qu zuo! (3) 你在 做 什 么::? ! (3) 快! (1) 去 做! (3) *what are you doing?!* (3) *hurry!* (1) *do it!* (3)	[qu **bowl!** [去 bowl! [*go bowling!*
3. Deon		[wo zai kan. [我 在 看. [*I am watching.*
4. Filip	ta men bu - (2) 他 们 不 - (2) *they are not - (2)*	
5. Betty	zuo le! 做 了! *did it!*	
6. Filip	ke yi le! 可以了! *fine!*	
7. Vidal	zhe ge yao san ge. 这 个, 要 三 个. *this one, we need three.*	
8. Betty	hao. 好. *ok.*	

The children in this activity (e.g. Deon (d), Vidal (v)) are peers who Betty almost never talks to, except during these activities, yet Table 3 shows that both Deon and Vidal promote Betty's use of Chinese during non-academic time, although their impact does not reach a statistically significant level.

On the other hand, when Betty plays with her best friends and other girls during recess, their activities involve in-group/out-group distinction and are much more personal and exclusive than activities with Filip. These activities include drawing pictures, making art crafts, reading books, doing role plays with dolls, sitting on the carpet and watching cartoons, to name a few. In those situations, two or three girls are typically observed to sit close to each other, talking in normal or low voices in English. Other peers do not come and go. In Example 19, Betty and one of her best friends Zoey are sitting close to each other at Zoey's desk and making a small illustration book together. The two girls are negotiating about the color of the emoji face on the cover of their book. As we can see from this example, their interaction is completely in English.

Example 19. 3/9/2020. Context: Recess.

1. Betty wait, should we color the whole thing yellow↑? oh em this color↑?
2. Zoey I wanna color green.
3. Betty no:::
4. Zoey I LIKE green.
5. Betty then we color it (2) `[this.
6. Zoey [green is a bright color!
7. Betty this is a bright color. it's a brightER color.
8. Zoey no:::, I wanna do it in green::::
9. Betty what if we did it (2) purple?
10. Zoey ok. ((reluctantly agrees))

In fact, in contrast to Filip whose social interactions with other people do not involve much of an insider/outsider designation, Betty is observed to devote some of her

energy to maintaining her friendship clique and to monitoring the dynamics among clique members. For example, Betty is observed to mediate among her three best friends (i.e. Elin, Zoey and Stella) and pick who she will be with during the next activity when all of them want to be together with her. Betty is also observed to decline Elin's request for admission to the drawing activity she and Zoey are doing, saying it's because Elin was playing with Filip and his friends earlier. The friendship clique appears to have its own unique dynamics that distinguishes it from the larger classroom community in all kinds of ways, including but not limited to the language they use to talk to each other and the ways they behave and do things during non-academic time. English seems to be the language that is used by the clique insiders, possibly as a way to mark their group membership.

The insider/outsider distinction, however, also seems to account for Betty's language shift when she is addressing grown-ups (i.e. the homeroom teacher and the researcher), who obviously are not members of her friendship clique. For example, Betty appears to purposefully distance herself from the homeroom teacher. In Example 20, during snack time, Betty and one of her best friends Stella are standing and reading books at the corner of the classroom, which is very far away from the homeroom teacher's desk. In line 1, Stella proposes that they move and sit on the carpet, which is close to the teacher's desk. In line 2, Betty rejects Stella's proposal and insists that they stay where they are, because then they don't have to listen to "Ms. Teng blah blah blah", suggesting a kind of surreptitious resistance against the authority of the teacher.

Example 20. 3/4/2020. Context: Snack Time.

1. Stella why don't we go over there and sit?

((proposing they move and sit on carpet))

2. Betty **no, let's stay here, it's better.** teng lao shi **blah blah blah**.
no, let's stay here, it's better. 滕 老 师 blah blah blah.
no, let's stay here, it's better. Ms. Teng blah blah blah.

In fact, Betty is observed to carry out her subtle rebellion in a variety of situations, as in Examples 21-24 below. In Example 21, Betty criticizes the teacher in private when she hears the teacher laughing softly with her colleague. When Betty criticizes the teacher as being weird, she keeps her voice very low so that her criticism is only audible to her group members.

Example 21. 3/4/2020. Content: Math. Context: Producing written assignment.

Betty °° teng lao shi **is weird**. °°
°° 滕 老 师 is weird. °°
°° *Ms. Teng is weird.* °°
((the teacher laughing softly with her colleague))

In Example 22, Betty surreptitiously objects to the teacher's announcement that nobody is allowed to speak English in the classroom. In this example, Betty and Elin are having snacks together during snack time. After Betty hears the teacher's announcement in line 1, five seconds later, she says to Elin in a low voice in English that "that is what people do, see?", and then winks at Elin pointing out to her that there is actually a bunch of children crowded in Wayne's group who are speaking English.

Example 22. 3/12/2020. Context: Snack Time.

1. T dou bu neng shuo ying wen. (5)
都 不 能 说 英 文. (5)
nobody can speak English. (5)

2. Betty that's what people do. see?
((winking at Elin and looking at Wayne's group))

Betty's surreptitious resistance is also launched against authority figures in general. In Example 23, Betty jokes about the researcher's and another Chinese immersion teacher's family names and at the end of the exchange, purposefully breaks the school rules by kicking someone's locker on her way back to the classroom from the restroom. In Chinese, the character 牛(niu) can mean a person's family name, but it also can refer to animals such as ox, cow, cattle, bull, etc. In addition, the sound "zhu" in Chinese can mean a person's family name which is written as 朱, but it can also mean pig, written as 猪.

Example 23. 3/9/2020. Context: Recess.

1. Betty	who did you ask to go to the bathroom?
2. Elin	liu lao shi. 刘 老 师. *Ms. Liu.*
3. Betty	niu lao shi. 牛 老 师. *Ms. Niu.*
4. Elin	`liu. `刘. `*Liu.*
5. Betty	niu lao shi. **wait, you know** zhu lao shi? 牛 老 师. wait, you know 朱 老 师? *Ms. Niu. wait, you know Ms. Zhu*?
6. Elin	yeah ↑.
7. Betty	do you know what zhu means? ok! and then lao shi is teacher. (1) 朱 老 师
8.	°°pig teacher°°.
9. Elin	oh::

10. Betty {I guess-} I guess zhu lao shi really likes `pigs.
朱 老 师
{I guess-} I guess Ms. Zhu really likes `pigs.

11. Elin uh-huh.

12. Betty wait. ((hardly kicking someone's locker))

13. Elin you SHOULDN'T do that ↑!

14. Betty I just- ((running and hopping back to the classroom))

As we can see from Example 23, Betty's behavior sharply contrasts with Elin's. Whereas Elin seems to want to follow the rules – she corrects Betty's pronunciation of the researcher's family name and reprimands Betty for kicking the locker in lines 4 and 13, Betty seems to simply want the excitement that her surreptitious resistance brings to her.

Sometimes Betty uses her friends to help her accomplish her rebellion. In Example 24 below, based on Stella's retelling to Vidal of what happened during imagination fair (captured by Filip's lapel mic), Betty pushes Elin to kiss Filip. Betty's behavior makes Filip very unhappy for a couple of days, and also creates quite a bit of gossip in the classroom.

Example 24. 3/11/2020. Context: Recess.

1. Stella Betty pushed Elin at the imagination fair to Filip, and then-

2. Vidal {do they-} do they want to kiss you?

3. Filip bu yao.
不 要.
no.

4. Vidal bei di **push** ta **kiss you**?
贝 蒂 push 她 kiss you?
Betty pushed her to kiss you?

5. Filip you! ((saying with anger))
有！
yeah!

Interestingly, although Betty surreptitiously rebels against the teacher, she does not rebel against the teacher's ally Filip. In fact, Betty is observed to joke in Chinese with Filip when they are playing together. In Example 25, as the first pair who finish doing the academic task, Betty and Filip go to the corner of the classroom and start to play. At the beginning of play, the two spend some time arguing with each other about the possession of chess pieces and toy bricks. We see that Betty and Filip are repeating the same Chinese phrase back and forth as they negotiate for power and physically fight for who should have the box of chess pieces. Although the two children have a lot of disagreements and they pull back and forth psychologically for a long time, they do not seem to be upset with each other. As we can see in lines 6 and 7, although the two snatch the box of chess pieces back and forth, Betty giggles in line 7 after Filip snatches it back, which indicates that Betty seems to have fun in the power negotiation process with Filip. In other words, it seems that Betty does not care whether she has the chess pieces or not; her goal seems to change from originally fighting for the chess pieces to simply joking around with Filip and having fun.

Example 25. 3/10/2020. Context: Recess.

1.Filip hao! (3) gei wo. ((snatching the box of chess pieces))
好！(3) 给 我.
ok! (3) *give it to me.*

2. Betty gei wo zhe ge
给 我 这 个.
give me this.

3. Filip bu, {wo-} wo you zhe ge, ni you na ge. (2) hao ba?

不, {我-} 我 有 这 个, 你 有 那个. (2) 好 吧?
no, {I-} I have this, you have that. (2) ok?

4. Betty bu, wo you zhe ge, ni you zhe ge.
不, 我 有 这 个, 你 有 这个.
no, I have this, you have this.

5. Filip bu, wo you zhe ge, (0.5) ni you na ge.
不, 我 有 这 个, (0.5) 你 有 那个.
no, I have this, (0.5) you have that.

6. Betty wo you `zhe ge
我 有 `这 个. ((Betty snatching the box of chess pieces from Filip))
I have `this.

7. Filip bu! (0.5) bu na wo::!*
不! (0.5) 不 拿 我::!*
no! (0.5) don't take mine!
((Filip snatching the box of chess pieces back; Betty giggling))

After the negotiation in Example 25, they start to play together collaboratively and share the toys. The play seems enjoyable for both children; Filip dominates the play as he usually does, and Betty, as an active participator, giggles and laughs many times during the play. Both children speak Chinese almost exclusively during the interaction. However, Betty is never observed to joke or play in Chinese with either the teacher or the researcher.

Summary of the Interlocutor Effect on Betty's L1 and L2 use

Findings show that Betty dramatically differentiates her language use depending on who her interlocutor is. When Betty talks to grown-ups (i.e. the teacher and the researcher), she almost always speaks Chinese during both academic and non-academic time. When she talks to a peer(s), the "mini-teacher" Filip is the only child who strongly promotes Betty's use of Chinese, whereas her clique members strongly promote her use of English in both the academic and the non-academic settings.

Qualitative analysis results suggest that the pattern of Betty's language use seems to relate to the following factors: (1) the roles being played by the interlocutors and by Betty in the classroom, (2) differing group play styles, and (3) friendship levels between Betty and her interlocutor(s). Filip significantly promotes Betty's use of Chinese regardless of whether it is academic or non-academic time potentially because Filip is acting as a mini Chinese immersion teacher during academic time and a leader/organizer of play activities during non-academic time. As the mini Chinese immersion teacher during academic time, Filip speaks Chinese to all the other children all the time, and he checks other children's assignments and works with them in Chinese on the problems they have. As the leader of play during non-academic time, Filip orchestrates play activities, sets up rules and tells people what to do in Chinese; anybody is welcome to join these activities. Filip's roles as mini-teacher and as playleader are tightly intertwined because both roles are representations of power and authority, and both roles request a lot of accommodation from the other children, including the language they use with Filip. Betty, when talking to Filip, clearly demonstrates a high level of accommodation by speaking Chinese, his language of choice. Additionally, Filip also monitors Betty's language use during both academic and non-academic time, warning her when she speaks English, which also seems to contribute to Betty using a lot of Chinese when she is talking to Filip.

The friendship level between the two children also seems to relate to Betty's Chinese use with Filip, especially during academic time. Although Betty has a good relationship with Filip, they are not each other's best friends. Thus, when the two children work together, they seem to be always on task and rarely have any extensive

interaction around anything other than the task they are doing. Not being each other's best friends seems to confine their range of conversation topics to academic ones, which are very likely to occur in Chinese given the Chinese input they have received from the teacher.

In contrast, Betty's clique members strongly promote her use of English during both academic and non-academic time. Qualitative analysis reveals very different power structures when Betty is talking to Filip compared to her clique members. Whereas Betty is a follower when she talks to Filip, accommodating to Filip's language use, she becomes the leader of the girls' group in which she monitors the group dynamics and makes her followers accommodate to her. The meetings that Betty organizes are closed and exclusive and involve a clear in-group/out-group distinction. During those in-group gatherings, Betty speaks English, which she seems to use to establish her authority as opposed to the teacher's authority in this particular realm.

In fact, qualitative analysis suggests that in addition to being the leader of her girls group, Betty seems to be acting like a covert rebel leader in relation to the whole class. She creates a pocket of resistance, kind of revolutionary but also surreptitious. She acts like an obedient student in front of the teacher and she never directly confronts the teacher with her English language use, but when she is with her clique where she is the leader, she almost always speaks English, and she purposefully keeps group meetings at a distance from the teacher so that she can hide her English use from the teacher. For Betty, the teacher seems to be on her opposite side, like a rival, someone she wants to surreptitiously rebel against. English seems to be the language that Betty leverages to accomplish her rebellion.

Interestingly, whereas Filip is the teacher's little friend, Betty does not seem to view him as her rival. She is observed to joke and laugh with Filip in Chinese in a way she never does with the teacher (or the researcher). Viewing the teacher (and the researcher) as her opponents seems to prevent Betty from joking, teasing, or laughing with them in Chinese in the way that she does with Filip.

When Betty's interlocutor is *self* in instances of private speech, it strongly promotes Betty's use of Chinese during academic time and use of English during non-academic time. Whereas Betty produces a lot of private speech in Chinese during academic time as a way to peripherally participate in the whole class discussion, she produces a lot of private speech in English during non-academic time. In those situations, Betty uses a lot of vernacular terms in English particularly when her friends are present. Interestingly, while Betty shifts the range of her pitch to indicate a shift of interlocutor, she does not lower the volume of her voice when she speaks to herself in English, suggesting that she does not seem to care whether the teacher hears it or not. This observation also seems to lend support to the notion that Betty surreptitiously resists the teacher's authority, something taken up in more detail in the discussion/conclusion.

Filip – Mini Teacher

The test of significance of random effects using a log-likelihood ratio test shows that the interlocutor variable exerts a statistically significant impact on Filip's language choice during academic time. Table 4 below summarizes the output for Rbrul's mixed-effect logistic regression model of Filip's Chinese use during academic time – that is, during teacher-fronted instruction and interactive activities on health, Chinese language arts, math and science, and during homework time when Filip is doing written

assignments mostly on Chinese language arts and math. As we can see from Table 4, the intercepts run from 0.452 to -0.595[5], which means that different interlocutors exert different degrees of influence on Filip's use of Chinese vs. English. However, it is worth noting that the range of variation in the degree of influence exerted by Filip's interlocutors, as shown by the intercepts in Table 4, is much narrower than the range of variation in influence of Betty's interlocutors in Table 2. This means that Filip does not vary in his language use depending on who his interlocutor is as much as Betty does during academic time. As we can see from the column of proportions in Table 4, this is because Filip almost always uses Chinese with all the interlocutors that he encounters during academic time.

Table 4
Rbrul's mixed-effect model for Chinese use during academic time: **Filip**

ONE-LEVEL ANALYSIS OF RESPONSE Language use WITH PREDICTOR(S): Interlocutor [random, not tested] and Task Activity (0.127) + On/Off Task (0.193) + Task Content (0.279)

$Task Activity					
Factor	log-odds	tokens	proportion (c/c+e)	uncentered weight	p-values
producing written assignments (w)	0.617	941	0.976	0.594	0.0557
interactive activities (i)	0.061	362	0.967	0.456	0.8758
teacher-fronted instruction (f)	0.000	1229	0.969	0.441	--
$Task Content					
Factor	log-odds	tokens	proportion (c/c+e)	uncentered weight	p-values
health (h)	0.931	119	0.975	0.656	0.1890
science (s)	0.466	77	0.974	0.545	0.5339
math (m)	0.412	1402	0.976	0.531	0.1093
Chinese language arts (c)	0.000	934	0.963	0.429	--
$On/Off Task					
Factor	log-odds	tokens	proportion (c/c+e)	uncentered weight	p-values
on task (o)	0.44	2153	0.974	0.516	0.1786
off task (f)	0.000	379	0.955	0.408	--

[5] Positive numbers promote Chinese and negative numbers promote English, and the significance of each number is noted in the right-hand column.

$` Interlocutor (random)

	intercept	tokens	proportion (c/c+e)	p-values
Standard deviation	0.492	2532	0.971	
...	...	...	...	
homeroom teacher (t)	0.452	917	0.979	0.0253*
self (s)	0.444	143	0.993	
children sitting near Filip during teacher-fronted instruction – Liz, Frank, David, Andrea, Stella (7)	0.231	60	0.983	
Elin (e)	0.194	37	1	
Brian (n)	0.161	65	0.985	
Deon (d)	0.158	25	1	
Group members (g)	0.123	26	1	
Zoey (z)	0.088	9	1	
Stella (o)	0.075	17	1	
Frank (c)	0.06	11	1	
Andrea & Evelyn (ay)	0.036	7	1	
Mia (i)	0.026	5	1	
Andrea & Betty &John (abj)	0.019	2	1	
Betty & Elin & Zoey (bez)	0.019	2	1	
Deon & Vidal (dv)	0.013	2	1	
microphone (m)	0.01	17	0.941	
Vidal (v)	0.009	394	0.972	
Andrea & Frank & Nikki (ack)	0.008	2	1	
Betty & Elin (be)	0.006	1	1	
researcher (r)	0.006	43	0.977	
Nikki (k)	-0.037	183	0.978	
Betty (b)	-0.047	154	0.968	
whole class (p)	-0.078	134	0.955	
Evelyn (y)	-0.11	16	0.938	
health teacher (t2)	-0.111	74	0.973	
John (j)	-0.166	11	0.909	
Liz (l)	-0.364	28	0.893	
Jasen (x)	-0.478	15	0.8	
Andrea (a)	-0.568	15	0.8	
Wayne (w)	-0.595	117	0.915	0.0476*

$misc.1

n	df	intercept	overall proportion	uncentered input probability
2532	8	2.582	0.971	0.97

$misc.2

log-likelihood	AIC	AICc	Dxy.fixed	Dxy.total
- 324.346	664.692	664.75	0	0.383

R2.fixed	R2.random	R2.total
0.036	0.066	0.102

In Table 4 we see that during academic time, only interlocutors whose p-values are smaller than 0.05 exert a statistically significant effect on Filip's choice between

Chinese and English. Using that standard, there are only two interlocutors who significantly affect Filip's use of Chinese and English during academic time: the homeroom teacher and Filip's frenemy Wayne. Notice that the homeroom teacher appears at the very top, indicating that the homeroom teacher as interlocutor most strongly promotes Filip's use of Chinese. As we can see, Filip produces the largest amount of tokens with the homeroom teacher (917) and almost always uses Chinese to speak to the homeroom teacher (0.979). On the other hand, Filip's frenemy Wayne locates at the very bottom of the list of interlocutors, which means that Wayne as interlocutor most strongly promotes Filip's use of English during academic time. Notice in Table 4 that Filip produces a number of tokens with Wayne (117), but the proportion of his Chinese use with Wayne is among the lowest (0.915). One might not expect to see that children who Filip designates as his best friends (i.e., Vidal, Deon, and Frank) and Filip's group members (i.e. Vidal, Stella, Nikki) who he spends most of his time with during academic time do not exert any significant effect on Filip's use of Chinese vs. English; his use of Chinese with them is no different from his use of Chinese with other peers. The researcher and self, interlocutors who significantly promote Betty's use of Chinese during academic time (Table 2), do not exert any statistically significant impact on Filip's language choice during academic time; Filip uses Chinese with them just as he uses it with almost all his peers.

During non-academic time – that is, during transitions, recess and snack time – according to a measure of significance of random effects using a log-likelihood ratio test, the interlocutor variable exerts a statistically significant impact on Filip's use of Chinese and English. Table 5 below summarizes the output for the Rbrul mixed-effect logistic

regression model of Filip's Chinese language use during non-academic time; it shows that the intercepts run all the way from 2.168 down to -3.891[6], a range that is much wider than that during academic time in Table 4. This means that, for Filip, variation in the degree of influence of the interlocutor variable is much more dramatic during non-academic time than during academic time.

Table 5
Rbrul's mixed-effect model for Chinese use during non-academic time: **Filip**

ONE-LEVEL ANALYSIS OF RESPONSE Language use WITH PREDICTOR(S): Interlocutor [random, not tested] and Activity (1.71e-08)

$ Activity					
Factor	log-odds	tokens	proportion (c/c+e)	uncentered weight	p-values
recess (r)	0.000	1479	0.939	0.586	--
snack time (s)	-0.965	374	0.840	0.35	< 0.0001***
transitions (t)	-1.108	366	0.847	0.318	< 0.0001***
$` Interlocutor (random)					
	intercept	tokens	proportion (c/c+e)	p-values	
Standard deviation	1.621	2219	0.907		
...	...	...	...		
researcher (r)	2.168	74	1	0.0177*	
Betty (b)	1.436	110	0.991	0.0478*	
John & Brian (jn)	1.338	49	1		
teachers (t)	1.194	188	0.979	0.0095**	
microphone (m)	0.821	7	1		
Vidal & Wayne (vw)	0.794	6	1		
self (s)	0.717	30	0.967		
Zoey (z)	0.686	9	1		
Andrea (a)	0.61	4	1		
Nikki (k)	0.575	30	0.967		
Stella (o)	0.545	6	1		
Betty & Elin (be)	0.541	4	1		
Elin (e)	0.474	109	0.972		
Deon & Liz (dl)	0.442	6	1		
Deon & Brian & Wayne (dnw)	0.4	6	1		
Liz & Brian & Jasen (lnx)	0.388	2	1		
Jasen (x)	0.382	97	0.959		
Betty & Vidal (bv)	0.355	5	1		
Deon & Elin & Vidal (dev)	0.295	4	1		
Deon & Elin & Jasen (dex)	0.295	4	1		
Wayne & Jasen (wx)	0.295	4	1		

[6] Positive numbers promote Chinese and negative numbers promote English, and the significance of each number is noted in the right-hand column.

Brian & Wayne (nw)	0.287	2	1	
Deon & Nikki & Vidal (dkv)	0.235	3	1	
Elin & Deon (ed)	0.235	3	1	
7	0.225	1	1	
Mia & Wayne (iw)	0.225	1	1	
John & Brian & Jasen (jnx)	0.225	1	1	
Deon & Elin & Brian & Vidal (denv)	0.167	2	1	
Deon & Wayne (dw)	0.167	2	1	
Liz (l)	0.094	49	0.959	
Betty & Deon (bd)	0.09	1	1	
Deon & Nikki & Liz & Brian & Wayne (dklnw)	0.09	1	1	
Brian & Vidal (nv)	0.09	1	1	
Vidal & Evelyn (vy)	0.09	1	1	
Deon & Elin & Liz & Jasen (delx)	0.006	27	0.963	
Vidal (v)	-0.123	208	0.938	
Deon (d)	-0.227	205	0.946	
John (j)	-0.237	34	0.941	
Betty & Deon & Elin & Vidal (bdev)	-0.292	18	0.944	
Mia (i)	-0.293	100	0.94	
Brian (n)	-0.508	145	0.89	
Deon & Jasen (dx)	-0.525	13	0.923	
Frank (c)	-0.529	29	0.897	
Evelyn (y)	-0.659	101	0.901	0.0481*
whole class (p)	-1.034	129	0.837	< 0.0001***
Deon & Vidal (dv)	-1.253	55	0.818	0.0004***
group members (g)	-1.389	8	0.625	0.0448*
Wayne (w)	-1.77	247	0.741	< 0.0001***
Frank & Vidal (cv)	-1.93	6	0.667	0.0234*
Liz & Vidal (lv)	-2.028	1	0	
Elin & Brian (en)	-2.64	11	0.364	< 0.0001***
Betty & Wayne (bw)	-2.788	6	0.167	0.0002***
Deon & Brian & Vidal (dnv)	-2.979	2	0	0.0054**
Frank & Brian (cn)	-3.891	10	0	< 0.0001***

$misc.1

n	df	intercept	overall proportion	uncentered input probability
2219	4	3.249	0.907	0.948

$misc.2

log.likelihood	AIC	AICc	Dxy.fixed	Dxy.total
-588.557	1185.114	1185.132	0	0.605

R2.fixed	R2.random	R2.total
0.039	0.427	0.466

In Table 5, during non-academic time, only interlocutors whose p-values are smaller than 0.05 exert a statistically significant effect on Filip's choice of Chinese or

English. Using that standard, in Table 5 only three interlocutors significantly promote Filip's use of Chinese during non-academic time. They are the researcher, Betty and the homeroom teacher. Notice that the researcher is at the very top, indicating that the researcher as interlocutor most strongly promotes Filip's use of Chinese during non-academic time. Following the researcher, Betty as interlocutor is the second strongest promoter of Fynn's use of Chinese in non-academic settings. The homeroom teacher comes *after* Betty, being the third strongest promoter of Chinese during non-academic time. In contrast to the pattern with Betty (Table 3), *self* promotes Filip's use of Chinese even during non-academic time, although not at a statistically significant level. This finding seems to suggest that Filip is really devoted to speaking Chinese, in that he even speaks to himself in Chinese during non-academic time.

At the bottom of the list of interlocutors in Table 5, we see there are many children as his interlocutors who significantly promote Filip's use of English during non-academic time. This pattern is very different from the impact of interlocutors on Filip during academic time (Table 4) when Filip's frenemy Wayne is the only one who significantly promotes Filip's use of English. During non-academic time, in addition to Wayne, there are many other children who also significantly promote Filip's use of English. However, the number of tokens and the proportions of Chinese addressed by Filip to these children makes it hard to determine whether any one of them encourages more English than others.

Taking Tables 4 and 5 together, we see that Filip does not seem to change his language behavior very much between academic and non-academic time; he almost always speaks Chinese in both contexts. These two tables also suggest that, unlike Betty,

the influence of Filip's different peers is statistically the same and negligible on the whole, except for Wayne who strongly promotes Filip's use of English during both academic and non-academic time. In the following section, I will elaborate on Filip's language use with specific transcript segments documenting Filip's interactions with different interlocutors in the classroom.

Filip's Interactions with the Homeroom Teacher

Tables 4 and 5 above show that the homeroom teacher significantly promotes Filip's use of Chinese during both academic and non-academic time. In my informal conversation with Filip before data collection, Filip told me that he likes the homeroom teacher very much. Qualitative analysis of the data also suggests that Filip cares a lot about what the teacher thinks of him and is trying hard to be a smart and competent student in front of her. Filip is observed to actively participate in whole class discussion, competing with all the other children to be the very first to answer the teacher's questions, as we see in Example 26. Filip is also observed to frequently talk to the homeroom teacher in Chinese during both academic and non-academic time, presumably to remain good terms with the teacher, as in Examples 27 and 28 below.

In Example 26, the class is having their math lesson during academic time. As we can see in this example, while all the other children are still processing the teacher's question and do not respond to the teacher, Filip answers the teacher's question in Chinese loudly and quickly in line 2. After the teacher repeats the question in line 3 to elicit an answer from all the other children, in line 4 Filip quickly and loudly repeats his answer ("*two points*") in Chinese.

Example 26. 3/4/2020. Content: Math. Context: Teacher-fronted instruction.

1. T	fa qiu shi yi fen yi ge. na liang ge fa qiu shi duo shao fen? 罚 球 是 一 分 一 个. 那 两 个 罚 球 是 多 少 分? *one free throw is one point. How many points are two free throws?*
2. Filip	liang fen! ((no response from all the other children)) 两 分! *two points!*
3. T	bu zhi dao? yi ge fa qiu shi yi fen, na liang ge fa qiu ne? 不 知 道? 一个罚 球 是 一 分, 那 两 个 罚 球 呢? *no clue? one free throw is one point, how about two free throws?*
4. Filip	liang fen! 两 分! *two points!*

In Example 27 below, Filip initiates a conversation with the homeroom teacher during academic time. During homework time for Chinese language arts, the children are making up their own sentences in Chinese with the following structure provided by the teacher: "if I had a *name of pet*, I am going to *things you will do to take care of the pet*." Filip wants to write about his pet lizard. However, he does not know the Chinese word for it, so he goes to the teacher's desk and asks, and then stays on to clown around with her.

Example 27. 3/9/2020. Content: Chinese language arts. Context: Producing written assignments.

1. Filip	{wo bu-} wo bu zhi dao *shen me xie wo de dong wu. {我 不-} 我 不 知 道 *什 么 写 我 的 动 物. {*I don't-*} *I don't know how to write my animal.*
2. T	xi yi ((teacher writing on Filip's notebook)) du, xi:: yi. 蜥蜴 读, 蜥::蜴. *lizard* *read, lizar::d.*
3. Filip	xi:: yi, o, tai ke ai! ((Filip moving his tongue in and out like a lizard)) 蜥::蜴, 哦, 太 可爱! 133

lizar::d, oh, so cute!

4. T ai ai ai zhen shi e xin si wo le! ((teacher laughing))
哎哎哎 真 是 恶 心 死 我 了!
hey hey hey it's yucky!

5. Filip wo zai ku:::: ((Filip making funny noises and pretending he's crying))
我 在 哭::::
I am crying::::

6. T hao xing le xing le xing le , xi jing. ((teacher laughing))
好 行 了 行 了 行 了，戏 精.
ok enough enough enough, drama king.

In line 3, after Filip repeats the word "*xi yi*" upon the teacher's request, he initiates a new conversation with her simply for fun, praising his pet lizard as being "*so cute!*" in Chinese, while moving his tongue in and out of his mouth to mimic his pet lizard. In line 4, the teacher, who finds Filip's mimicking to be very funny, laughs and jokes that the lizard is yucky. In line 5, Filip jokes back in Chinese saying "*I am crying::::*" in a very exaggerated way, lengthening the Chinese word for cry for quite a while, and then making funny noises to pretend he is crying. In line 6, the teacher who seems to be totally amused by Filip's exaggerated performance laughs and comments that Filip is a drama king. As we see in this example, Filip initiates the conversation with the teacher and keeps the conversation moving ahead entirely in Chinese. Both the teacher and Filip seem to have fun talking to each other during this short conversation.

During non-academic time, Filip is also observed to frequently go and talk to the homeroom teacher in Chinese, sometimes sharing his life after school. In Example 28, during recess, Filip goes to the teacher's desk and shares his experience of watching a girls' basketball game during the previous weekend and getting the autograph of Paige Buecker, a basketball player.

Example 28. 3/9/2020. Context: Recess.

1. Filip	teng laoshi,{zai eh (1) zai em (1)zai (1) xing qi san (0.5)} 滕 老师, {在 eh (1) 在 em (1) 在 (1) 星 期 三 (0.5)} *Ms. Teng, {on eh (1) on em (1) on (1) Wednesay (0.5)}*
2.	{zai em (1) zai em **Tuesday**-}zai **Tuesday** wo qu le- eh (1) {wo qu le eh} {在 em (1) 在 em Tuesday-} 在 Tuesday 我 去 了- eh (1) {我 去 了 eh} *{on em (1) on em Tuesday-} on Tuesday I went- eh (1) {I went eh}*
3.	wo ke yi shuo ying wen. 我 可 以 说 英 文. *I am going to speak English.*
4. T	ni qu le na'er 你 去了哪儿? *where did you go ?*
5. Filip	{wo qu le eh}(0.5) wo qu le yi ge di fang jiao Hopkins↑, {我 去 了 eh} (0.5) 我 去 了一 个 地 方 叫 Hopkins↑, *{I went eh} (0.5) I went to a place called Hopkins↑,*
6.	ta men eh (1) wo kan-= 他 们 eh (1) 我 看- = *they eh (1) I watched- =*
7. T	= da lan qiu = 打 篮 球. = *play basketball.*
8. Filip	dui dui {ta men ta men- (1) em wo you na dao zui-} 对 对! {他 们- 他 们- (1) em 我 有 拿 到 最-} *right right! {they- they- (1) em I got the-}*
9.	wo you na dao eh (2) **Paige** de **autograph**, wo you na dao 我 有 拿 到 eh (2) Paige 的 autograph, 我 有 拿 到. *I got eh (2) Paige's autograph. I got that.*
10. T	zhen de a! 真 的 啊! *really!*
11. Filip	zhen de, wo ke yi dai lai, ming tian wo ke yi dai lai. 真 的, 我 可以 带 来, 明 天 我 可 以 带 来.

really, I can bring it, I can bring it tomorrow.

12. T hao!
好!
great!

As we can see from this example from non-academic time, Filip speaks Chinese almost exclusively with the teacher. However, his sharing in Chinese is very disfluent and filled with many repetitions, pauses and discourse fillers (i.e. em and eh), which indicates that he is trying very hard to organize his thoughts in Chinese and to look for appropriate Chinese words to express his ideas. After some processing, restructuring, and word-seeking in lines 1 and 2, he seems to give up so in line 3: he informs the teacher that he is going to speak some English. This comment suggests that Filip clearly knows the teacher's expectation for Chinese use in the classroom and may be an indirect request for help. The teacher does start to scaffold the conversation by asking an eliciting question in Chinese in line 4 and then helping Filip to co-construct a Chinese utterance in line 7. With the teacher's help Filip actually only speaks three English words in lines 5 to 9: the name of a place – *Hopkins*, the name of a female basketball player – *Paige*, and *autograph*, a word that rarely appears in the Chinese input from the teacher in a second-grade classroom. The rest of his words are spoken in Chinese.

Filip speaks English to the homeroom teacher very rarely. When he does, it is generally in the following two circumstances: (1) saying a word or a chunk whose Chinese equivalent he doesn't know or cannot come up with at the moment of speaking, as we have already seen in Example 28 above, and (2) making cross linguistic identification during teacher-fronted instruction, as in Example 29 below.

In Example 29, during Chinese language arts in academic time, the teacher is introducing "ru guo", the Chinese word of *if* to the children. In line 1, the teacher asks the meaning of "ru guo". In line 2, Filip directly translates the word to English by saying *if*.

Example 29. 3/9/2020. Content: Chinese language arts. Context: Teacher-fronted instruction. Topic: *What pet do you want to have?*

1. T	ru guo shen me jiao ru guo 如 果， 什 么 叫 如 果？ *if, what does if mean?*
2. Filip	if.
3. T	hao ru guo wo you yi zhi chong wu. 好, 如 果 我 有 一 只 宠 物. *ok, if I had a pet.* ((writing "如果我有一只宠物" on whiteboard))

Filip's use of English is permitted by the teacher in this situation because saying it in English shows that Filip understands the meaning of the word correctly. Additionally, defining *if* as a conjunction word using complete Chinese can be very complicated and hard for children to understand. Filip's translation offers a quick and easy way for all the other children to develop a basic understanding of what "ru guo" means, and then as we can see in line 3, the teacher builds on Filip's contribution and moves on to contextualize the use of "ru guo" by making up a sentence with it.

Filip's Interactions with the Researcher

Filip's interactions with the researcher significantly promote his use of Chinese during non-academic time. Even though the researcher does not influence Filip's use of Chinese at a statistically significant level during academic time, he still produces a very high proportion of Chinese with the researcher (0.977, Table 4). Those interactions generally happen when Filip goes to the researcher's desk in the back of the classroom to

ask questions about his assignments, as we see in Example 30. During non-academic time, he chats informally with the researcher, as in Example 31, or even teases the researcher, as in Example 32 below.

In Example 30 below, the teacher asks the children to independently try the math problems she will be talking about later during math instruction, as a way to prime the children for the content. Basically, the math problems are about drawing lines to equally divide a particular shape, such as a triangle, a diamond, or a trapezoid, etc., into parts. Not surprisingly, most children, including Filip, cannot figure all of the problems out. Filip then comes to the researcher who sits at the back of the classroom and asks if he gets all questions right.

Example 30. 3/4/2020. Content: Math. Context: Students producing math assignments individually.

1. Researcher wo kan kan zen me la? ((Filip approaching the researcher))
   我 看 看 怎 么 啦？
   what's up?

2. Filip [wo jue de- ((showing his workbook to the researcher))
   [我 觉得-
   [*I think-*

3. Researcher [dui ya, ni hua de dui ma!
   [对 呀，你 画 的 对 嘛!
   [*right, you drew it right!*

4. Filip wo jue de zhe shi hai cuo de. ((pointing to a different question)) (5)
   我 觉 得 这 是 还 错 的.
   I think this is still wrong.

5. Researcher zhe ge wo jue de hao xiang bu tai dui,
   这 个 我 觉 得 好 像 不 太 对,
   I think this one doesn't seem right,

6. Filip shi de.
   是 的.

yeah.

7. Researcher shi ba? =
是 吧? =
right? =

8. Filip = o
= 哦
= *oh*

9. Researcher deng teng lao shi guo lai jiang ba.
等 滕 老 师 过 来 讲 吧.
let's wait until Ms. Teng talks about it.

10. Filip o o o wo zhi dao!
哦 哦 哦 我 知 道!
oh oh oh I know!

11. ni yao hua xian zai zhe'er, yin wei (1) zhe shi yi da de,
你 要 画 线 在 这儿, 因 为 (1) 这 是 一 大 的,
you should draw a line here, because (1) this is a big one,

12. ni ke yi zuo zhe ge. shi liang bian
你可以 做 这 个. 是 两 边.
you can do this. it's on two sides.

As we can see from Example 30, Filip speaks only Chinese with the researcher. In line 5, the researcher points out that Filip does not get a particular question right. To avoid meddling in the teacher's teaching plans, the researcher does not tell Filip the right answer to that question. Rather in line 9 the researcher suggests that Filip leave the question aside and wait for the teacher to talk about it as a whole class. Interestingly, Filip seems to consider the researcher's response to mean she doesn't know how to solve this problem, so he does not go back to his seat immediately. Rather, he stays around and shares with the researcher an idea that seems to just flash out in his mind by excitedly saying "*oh oh oh I know!*" in Chinese in line 10, and then he starts to draw on his notebook and to walk the researcher through his idea in Chinese in lines 11 and 12, like a

little teacher! Filip's behavior seems to indicate that he wants to impress upon the researcher that he is very capable and smart.

In Example 31, Filip takes his Ozobot, a desk-friendly coding robot, to school to play with other children during non-academic time. At the end of the play, with his Ozobot in hand, Filip goes to the back of the classroom to chat informally with the researcher and to show off his Ozobot. As we can see from Example 31, Filip initiates the conversation and keeps the conversation moving ahead in Chinese exclusively, even though some of his Chinese utterances seem to be strongly influenced by the rules of English. For example, what Filip says in line 1 sounds like he is fitting Chinese words into an English syntactic framework.

Example 31. 3/5/2020. Context: Recess.

1. Filip	ni zhi dao ta men you eh zhe ge eh {ji qi-} xiao ji qi ren zai wo men de xue xiao. 你 知 道 他 们 有 eh 这 个 eh {机 器-} 小 机 器 人 在 我 们 的 学 校. *you know they have eh the eh {robo-} small robots at our school.*
2.	ni zhi dao zhe ge ma? 你 知 道 这 个 吗? *do you know this?*
3. Researcher	wo bu zhi dao a, wo tou yi ci jian dao zhe ge. 我 不 知 道 啊, 我 头 一 次 见 到 这 个. *I don't know, this is my first time seeing this.*
4. Filip	{you-}(0.5) zai tu shu guan li {li you-}you zhe ge xiao ji qi ren. {有-} (0.5) 在 图 书 馆 里 {里 有-} 有 这 个 小 机 器 人. *{there-} (0.5) {in-} in the library there are small robots like this.*
5.	zhe shi wo de zui xi huan de {ji qi ren- xiao-} xiao ji qi ren de peng you. 这 是 我 的 最 喜 欢 的 {机 器 人- 小-} 小 机 器 人 的 朋 友. *this is my favorite {robot- small-} small robot's friend.* ((showing his Ozobot to the researcher))

6. Researcher o::
哦::
oh::

7. Filip tai ke ai!
太可爱！
so cute!

8. Researcher wo ye jue de zhe ge hen hao wan'er.
我 也 觉得这 个 很 好 玩儿.
I think it's entertaining too.

Filip even teases the researcher in Chinese during non-academic time, as if the researcher is one of his peers. In Example 32, Filip is playing the trick of telling people that there's something on their face/nose, then he quickly touches their face/nose and runs away. Filip first plays this trick on his frenemy Wayne, but unfortunately Wayne sees through it, so the researcher becomes his next target, as we see in Example 32 below. After playing the trick on the researcher, Filip starts to play it on Elin.

Example 32. 3/4/2020. Context: Recess.

1. Researcher gan shen me? ((approaching the researcher who's sitting at her desk))
干 什 么？
what's up?

2. Filip ni you yi ge dong xi zai zhe'er.
你有 一个 东 西在 这 儿.
you've got a thing here.
((quickly touching the researcher's nose and running away, giggling))

3. Researcher ni ge xiao huai dan!
你个小 坏 蛋！
you little daredevil!

Filip minimizes his use of English when he is talking to the researcher. If he speaks English, it is usually when he does not know the Chinese equivalent. In Example

33, Filip comes to the researcher and shares with the researcher that they are going to have an imagination fair later during that day.

Example 33. 3/9/2020. Context: Transition.

1. Filip	ni zhi dao jin tian shi **imagination fair**. 你 知 道 今 天 是 imagination fair. *you know today is the imagination fair.*
2. Researcher	ou shi ma? 哦 是 吗? *oh really?*
3. Filip	shi de. 是 的. *yeah.*
4. Researcher	shen me jiao **imagination fair**? 什 么 叫 imagination fair? *what's imagination fair?*
5. Filip	{jiu-(0.5)} ni hui zuo hen duo de dong xi. {就- (0.5)} 你会 做 很 多 的 东 西. *{like- (0.5)} you can make a lot of things.*
6.	{ni ke yi zuo yi ge:: em ni ke yi- (1) ni ke yi-} ni ke yi zuo yi ge dong xi. {你可以 做 一个:: em 你可以- (1) 你可以-} 你可以 做 一个 东 西. *{you can do a:: em you can- (1) you can-} you can make a thing.*

As we can see in line 1, Filip starts out in Chinese and switches to English to say "imagination fair". Not knowing what an imagination fair is, the researcher asks for clarification in line 4. In lines 5 and 6, Filip starts to explain to the researcher in Chinese what an imagination fair is, by simply reiterating the idea that people can make things. Filip's explanation is apparently not very clear, but he is trying hard to push himself to speak Chinese to the researcher, as we can see from the self-corrections, repetitions, filled and unfilled pauses. The researcher, although she still feels confused about what an imagination fair is, does not request a further explanation, because their conversation is

interrupted by Elin and Betty, who come and ask for permission to leave the classroom to get their name tags for the imagination fair. Like Filip, the two girls also switch from Chinese to English to say "imagination fair". The researcher learns from the teacher later that the imagination fair is a school-wide event during which children display the art and crafts they have made in the wood stadium of the school. Since it is a school-wide event and for the ease of reference, the event is not given a Chinese name.

Filip's Interactions with the Peers

Rbrul results (Tables 4 and 5) suggest that Filip talks to many peers during academic and non-academic time, but only a few exert a statistically significant impact on his use of Chinese vs. English. During academic time, his frenemy Wayne is the only peer who influences Filip's language use at a statistically significant level; he strongly promotes Filip's use of English. During non-academic time, Betty is the only peer who strongly promotes Filip's use of Chinese, whereas all the other children, including Wayne, significantly promote Filip's use of English.

The quantitative results, however, need to be interpreted with caution because the proportion columns in Tables 4 and 5 show that Filip almost always speaks Chinese with his peers in the classroom. This pattern apparently also applies to those children who strongly promote Filip's use of English during both academic and non-academic time. Since Filip speaks English so little and so seldom, it is very difficult to figure out a pattern in terms of who are encouraging him to use more English than others. Given that, I will not center my analysis on Filip's language use in relation to the effect of different peer interlocutors, because he is speaking Chinese almost exclusively with everybody and does not seem to differentiate his language use depending on who his peer interlocutor is

as much as Betty does. Rather I will describe typical situations and contexts in which Filip speaks Chinese and when he uses a little bit of English with other children, with examples from the transcripts.

Qualitative analysis of the data suggest that Filip's use of Chinese and English strongly relates to the role he plays during both academic and non-academic time, which seems to relate to him using a tremendous amount of Chinese.

During academic time, Filip is observed to play a role as a mini Chinese immersion teacher, helping other children with their assignments using complete Chinese. Example 34 is a very typical example of Filip playing his mini teacher role during academic time. In Example 34, Filip is helping his frenemy Wayne with his math assignment. While all the other children go to the restroom with the homeroom teacher to wash their hands and get ready for snack time, Filip chooses to stay in the classroom and work with Wayne on a word problem about fraction.

Example 34. 3/11/2020. Content: Math. Context: Producing written assignments.

1. Filip	{you si^ (4) ni you si ge zai^} ni you {si^} si ge yi fu, {有 四^ (4) 你 有 四个 在^} 你 有{四^} 四个衣服, *{there're four (4) you have four at^} you have {four^} four pieces of clothing,*
2.	{zhe yi^ zhe yi^ zhe yi^} zhe yi ge fen shu shi si fen zhi san. (1.4) {这 一^ 这 一^ 这 一^} 这 一 个 分 数 是 四 分 之 三. (1.4) *{this^ this^ this^} this fraction is three fourths. (1.4)*
3.	zen me xie zhe ge? (5) 怎 么 写 这 个? (5) *how do you write this? (5)*
4. Wayne	so it's three short sleeve shirts =
5. Filip	= shuo zhong wen! wo bu [hui- = 说 中 文! 我 不[会-

= speak Chinese! *I* [*can't-*

6. Wayne [you san:: ge:: zhe ge.
[有 三:: 个:: 这个.
[*there are three:: this.*
((Wayne using his pencil to point to the pictures of three short sleeves))

7. Filip `duan:: `yi `fu. (1.5)
`短:: `衣`服.(1.5)
`shor::t `sleeves. (1.5)

8. Wayne duan [yi fu
短 [衣服
short [*sleeves*

9. Filip [`duan `yi:: (5)
[`短::`衣:: (5)
[*`shor::t `sleeves:: (5)*

10. Wayne **and then::** (2) {wo bu zhi^} wo^ ((Filip sighs deeply))
and then:: (2) {我 不 知^} 我^
*and then:: (2) {I don't know^} I^*

11. Filip you yi ge chang yi, {you^, you ji ge^,} you ji fen zhi ji de (1) yi fu de?
有 一 个 长 衣, {有^, 有 几个^,} 有 几 分 之 几的 (1) 衣服的?
there's one long sleeve, {how^ how many^}what's the fraction (1)of the clothing?

12. Wayne o, san fen zhi yi.
哦, 三 分 之 一.
oh, one third.

13. Filip bu dui::! bu shi san fen zhi yi! (0.5) si fen zhi san! (10)
不 对::! 不 是 三 分 之 一! (0.5) 四 分 之 三! (10)
no right::! not one third! (0.5) three fourths! (10)
((leaving for restroom in a huff))

14. wo jue de wo shuo de hen qing chu, (0.5)
我 觉 得 我 说 的 很 清 楚, (0.5)
I think what I said is very clear, (0.5)
((coming back to the classroom))

15. `si:: `fen:: `zhi:: `san::. (2) shuo san ci! ((leaving again for restroom))
`四:: `分:: `之:: `三::. (2) 说 三 次!

three:: fourths::. (2) say it three times!

16. Wayne okay. ((laughing and writing down the correct answer on his notebook))

As we can see from Example 34, Filip behaves like a teacher in many respects. He first explains the idea of the word problem to Wayne in Chinese in lines 1 and 2. After his explanation, in line 3 he asks Wayne a question in Chinese to see if he understands. Unfortunately, Wayne does not seem to completely get the question, so he starts to think aloud in English in line 4. Hearing Wayne speaking English, in line 5 Filip crisply interrupts Wayne and seriously requests him to speak Chinese. In line 6, Wayne does not defy Filip's authority this time and switches to Chinese. However, not knowing the Chinese word for short sleeves, Wayne uses the Chinese demonstrative *this*, and at the same time points to the pictures of short sleeves with his pencil, which seems to be an indirect request for help. In line 7, Filip correctly reads Wayne's message and models the word in Chinese by saying it very slowly and in line 9, repeats the word together with Wayne to give him a little bit more scaffolding. When Wayne seems to get lost in line 10, Filip, after a long and heavy sigh, in line 11 offers Wayne a tip and repeats his question. Unfortunately, Wayne gives the wrong answer in line 12. In line 13, Filip, who seems to get frustrated, yells the right answer to Wayne and leaves for restroom in a huff. Surprisingly, ten seconds later, Filip comes back! In lines 14 and 15, he requests Wayne to repeat the correct answer three times, to make sure that Wayne at least knows the right answer to the question. The story ends up with Filip going to the restroom reassured and Wayne writing down the right answer on his notebook. This example is representative of Filip's language use with peers during academic time; he plays a role as a very conscientious mini teacher and always speaks Chinese to the other children.

During academic time, Filip is also observed to stand by the teacher's side, helping the teacher issue orders to the whole class in Chinese. Prior to the exchange in Example 35 below, the teacher asked the children to try the following math problem: there are three short-sleeves of different colors – red, blue, and green, and there are three pairs of pants of different colors – black, yellow, and orange, how many ways can they be matched? The teacher asked the children to first try this problem by themselves as a way to prime them for the upcoming math lesson on combination and permutation. As this is a hard problem, about half of the children cannot figure it out after some initial attempts, so the teacher starts to pair the children who got stuck with children who knew how to solve this problem. In Example 35, when the teacher asks the children who couldn't figure the problem out to come to the front of the classroom and stand in a line, in line 3 Filip quickly walks to the teacher and stands by her side, waving his arms to get other people's attention, and loudly addressing the whole class in Chinese that they should stand in the place where he stands. When he finds that some children do not line up in the particular place that the teacher designated, in line 6 he loudly and authoritatively repeats his order in Chinese and makes gestures so people know where they should line up.

Example 35. 3/12/2020. Content: Math. Context: Interactive activity.

1. T	mei ren ling yi ge, 每 人 领 一个, *everybody takes one,*
2.	ta men zhe ge hai mei zuo wan de jiu shi hai bu hui zuo de. 他 们 这 个 还 没 做 完 的就 是 还 不 会 做 的. *if they haven't finished yet, it means they got stuck.* ((talking to children who have worked the problem out))
3. Filip	oh!{zai- shi-} mei ge ren zai [{zhe-} zhe yi pai! oh! {在- 是- } 每 个 人 在 [{这-} 这 一 排!

oh! {in- it's-} everybody in [*{this-} this line!*
((Filip standing by the teacher's side, waving his arms to the whole class))

4. T [lai, guo lai.
[来，过来.
[*here, come here.*

5. wai wang qian zhan zhan, wang qian. yu bei::
再 往 前 站 站， 往 前. 预备::
move forward a bit, to the front. ready::

6. Filip zai zhe yi pai! ((gesturing where the other children should line up))
在 这一排！
this line!

In similar situations like Example 35, that is when Filip performs his role as the teacher's little helper, giving orders to the whole class on behalf of the teacher, he always speaks in Chinese, and mostly in an authoritative manner.

During non-academic time, Filip organizes and leads many play activities that anyone who feels interested in is welcome to join. As I mentioned in Betty's section, those activities involve a lot of construction tasks, physical movements, and competitions. During the activity, Filip is observed to speak loudly to all the other children in Chinese, setting up rules and telling people what to do. In Example 36, Filip and a group of children are playing toy blocks together in the corner of the classroom. They make two high barriers with the toy blocks and place chess pieces of different colors on top to stand for soldiers from two different armies. Since the barriers are very high and they begin to shake and break, the children decide to start the battle and tear down the barriers. However, they have different opinions about how they are going to tear them down. Deon and Betty want to drop a table tennis ball from the top and Vidal wants to bowl them over. Filip, as the leader of the play, agrees to break the barriers but

does not clearly make his position known in terms of how to do it. Misinterpreting Filip's message as an agreement to do bowling, Vidal throws the table tennis ball and the barriers collapses. Then the conversation in Example 36 occurs.

Example 36. 3/4/2020. Context: Recess.

1. Filip	ni men zuo shen me?! ((in a shocked tone)) 你 们 做 什 么?! *what did you guys just do?!*
2. Deon	you said we could [knock him down!
3. Elin	[dui bu- [对 不- [*sorry-*
4. Betty	ni shuo le! = 你 说 了！= *you said it!=*
5. Filip	={wo bu yao^} wo bu yao ni men zuo zhe ge! ={我 不 要^} 我 不 要 你 们 做 这 个! *={I don't want-} I don't' want you guys to do this!*
6. Elin	dui bu qi 对 不 起. *sorry.*
7. Vidal	[dui bu qi. [对 不 起. [*sorry.*
8. Filip	[ni zai zuo shen me?! ((noticing Jasen playing chess pieces on the floor)) [你 在 做 什 么？！ [*what are you doing?!*
9. Jasen	kan! you liang ge **king**. 看！ 有 两 个 king. *look! there are two kings.*
10. Filip	wo men yong:::! wo men zai yong::: ta men! 我 们 用::::! 我 们 在 用:: 它 们！

we are using:::! we are using::them!

As we can see in Example 36, in line 1 Filip is clearly very shocked and upset by what just happened, so he starts to blame his peers in Chinese for not listening to him. Deon and Betty, however, refuse to accept Filip's blame. They both stand to defend themselves and in lines 2 and 4, pass the buck to Filip, arguing that it is Filip who said they could knock the barriers down. In line 5, Filip, however, refuses to take any form of challenging and questioning; he forcefully asserts in Chinese that this is not what he wanted them to do. Interestingly, in lines 3, 6 and 7, both Vidal and Elin tell Filip in Chinese that they're sorry, which clearly contrasts with what Betty and Deon say in lines 2 and 4. Vidal and Elin's apology seems to indicate that both of them acknowledge Filip's absolute authority in the play group. Meanwhile, Filip catches Jasen starting to play with the chess pieces falling on the floor. Perhaps because his authority has been undermined by Deon and Betty and he wants to consolidate his identity as the leader of play, Filip stops Jasen right away and in lines 8 and 10, assertively tells him in Chinese that they are still using these chess pieces. Example 36 presents a very typical conversation between Filip and his peers when they are playing together during non-academic time, in which Filip orchestrates play and requests that people follow his rules. When Filip organizes play activities and serves as the leader, he is observed to almost always speak Chinese to other children, regardless of who they are. And the other children are observed to speak a lot of Chinese to Filip, too.

Filip speaks English to his peers very rarely. Among the rare instances in which Filip speaks a little bit of English, it seems to be when he steps out of his leadership role. In those cases, he is no longer the mini teacher or the leader of play. Rather, he joins

other people's conversations and activities in which English is already the language in use, so he accommodates to their language use by speaking a little bit of English, as Examples 37 and 38 show. In Example 37, the children are watching the Chinese version of the animation *Avatar: The Last Airbender* during snack time. While watching the cartoon, some children comment on the characters and scenes in English. As we can see from Example 37, in line 3 Filip joins their conversation in English.

Example 37. 3/4/2020. Context: Snack Time.

1. John he looks like an ant!
2. Nikki yeah he dreamed when he was like walking (…).
3. Filip {he-}he woke up, got a drink of water, and you'll turn into ant.
4. Vidal we know it's not ant.
5. Deon 'cause that was a dream!

In Example 38, during non-academic time, a group of children were playing circus under the leadership of Evelyn during recess. The theme of the unit of Chinese language arts in that week is *what pet do you want to have?* All of a sudden, there is a "pet fad" in the class, because during recess, under the leadership of Evelyn who claims that she is a pet trainer, a lot of children pretend that they are Evelyn's pets. Prior to the exchange in Example 38, a group of children, including Evelyn, were talking primarily in English about what animals they would pretend to be. In lines 2 and 3, Filip, who seems to find their play activity to be very interesting, walks close and joins their conversation in English, stating that he's a blue tongue skink, and describing and gesturing how big a blue tongue skink. Hearing Filip saying that he is a blue tongue skink, Brian, who is a puppy, dashes out from the group, and as he is fleeing, in lines 5, 6, 8, 10, and 12, he is also whining and yelling in English that Filip is his "ememean" ("enemy"). In line 4, when Filip sees Brian taking to his heels, in English he asks Brian not to be scared of

him. In lines 9 and 11, he follows Brian and pleads in English that Brian stops running away from him and calling him an “ememean”.

Example 38. 3/10/2020. Context: Recess.

1. Evelyn	crocodile.
2. Filip	I know! I am a blue tongue skink!
3.	they are really this big! they are really this big. (3) ((Filip gesturing how big a blue tongue skink is; Brian dashing from the group))
4.	Brian! (2) please don't be scared of me.
5. Brian	you are /ememean/ though! how you say it? /ememean/?
6.	you are /ememean/! ((/ememean/ means “enemy”; Brian running in the classroom and whining))
7. Filip	/eme`my/? ((does not seem to understand what Brian is saying))
8. Brian	you are /ememean/!
9. Filip	{eme-}stop it Brian. ((following Brian))
10. Brian	/ememean/!
11. Filip	stop it.
12. Brian	/ememean/ /ememean/!

Filip is also observed to speak a little bit of English with his peers when their conversations are not in earshot of the teacher or the researcher. Those conversations generally occur in the hallway or in the restroom. In Example 39, during snack time, Filip and Wayne are having a conversation in the hallway about a picture that used to be pasted inside of Wayne’s locker. Only the two boys are in the hallway, whereas the teacher, the researcher and all the other children are inside of the classroom. As we can see from Example 39, Filip talks to Wayne entirely in English.

Example 39. 3/4/2020. Context: Snack time; in front of the locker in the hallway.

1. Filip	why’s the person dead? he's dead. =
2. Wayne	= he's not dead. (1) his eyes are crossed so he’s coo::ler. (2) ((saying cooler in a funny voice))
3. Filip	no.
4. Wayne	[the teacher says-
5. Filip	[boo stupider. {what did-}what did she say?

6. Wayne she says it looks like me. (2)
7. Filip it looks like you being a dumb boy. dumb-dumb.
8. Wayne you know that I have the big muscles uh?
9. Filip ok, your muscles are actually tiny tiny.
10. Wayne then why are my muscles here so big?!
11. Filip oh look at these! (1) look at these! (2)
12. Wayne you never seen (…) before (…). (2)
13. Filip yes, and I don't need to know. (…). come on man.
((both going back to the classroom))

As we can see from Example 39, the English conversation between the two boys involves a lot of jockeying, competition and bragging. When Wayne is trying to use the character in the picture and a quote of the teacher's words to make the point that he is very cool, Filip flings back in line 7 that the character in the picture looks like Wayne being a numb boy. Wayne, however, does not give up. He quickly comes up with some new evidence – he has big muscles! Unfortunately, Wayne's new attempt to create a very cool image for himself by showing off his big muscles fails, because Filip completely disagrees that Wayne's muscles are big (lines 9 and 11) and Filip even suggests in line 13 that he doesn't care whether Wayne has big muscles or not. During his conversation with Wayne, Filip uses a lot of slang and vernacular terms, such as *boo, stupider, a dumb boy, dumb-dumb,* and *come on man.* These expressions are never observed when Filip speaks Chinese with his peers.

Filip is also observed to speak a little bit of English when he is using English to engage in language play and have fun, sometimes involving reference to peer culture. In Example 40, Wayne asks Brian why he doesn't go to the LEXICO program, a school-run English literacy program that serves students who need additional support. The children then start to engage in language play involving the name of the program. As we can see

from this example, Filip initially uses Chinese, but in line 11, shifts from Chinese to English when he also joins in the language play.

Example 40. 3/5/2020. Context: Recess.

1. Wayne	Brian you don't even go to lexiCO?!
2. Brian	oh yeah.
3. Evelyn	not lexiCO. lexico.
4. Brian	it's not lexiCO.
5. Filip	**Lexico** shi shen me? wo bu (1) tai zhi dao **Lexico.** Lexico 是 什 么? 我 不 (1) 太 知 道 Lexico. *what's Lexico? I don't (1) know that much about Lexico.*
6. Wayne	yo yo my name is Joe, my butt is bigger than Mexico!
7. Brian	yo yo my name is Joe, my butt is bigger than Mexico!
8. Filip	bu shi! shi- 不是! 是- *no! it's-*
9. Wayne	that was like that.
10. Filip	**no,** shi zhe ge! no, 是 这 个! *no, it's this!*
11.	hi my name is Joe, {my butt-} no, my butt is bigger than pigs.

Summary of the Interlocutor Effect on Filip's L1 and L2 Use

Findings show that Filip almost always speaks Chinese with not only the grown-ups (i.e., the teacher and the researcher) but also with all the other children he encounters in the classroom. Qualitative analysis suggests that Filip's use of Chinese seems to strongly relate to the role that he plays in the classroom. During academic time, Filip is observed to play the role of a mini teacher, conscientiously helping anyone who has

trouble with their assignments. During non-academic time, Filip is usually the organizer and leader of play activity which is open to and welcoming of everyone. For Filip, these two roles seem to be tightly intertwined because he clearly has his authority established and claimed in both contexts.

Data suggest striking distinctions between the ways that Filip and Betty respectively interact with people around them and navigate through their social lives at school, and apparently there are important language consequences of those differences. Unlike Betty, who surreptitiously rebels against the teacher and who is not committed to using Chinese all the time, Filip plays a role as the teacher's assistant and always speaks Chinese. Qualitative analysis suggests that Filip seems to care a great deal about what the teacher and the researcher think about him. He is observed to actively participate in teacher-fronted instruction, answering the teacher's questions quickly and loudly in Chinese to get the teacher's attention and approval. In other circumstances, he is observed to treat the teacher and the researcher as if they are his peers; he shares his life and all kinds of things with them in Chinese and sometimes even plays with them and teases them in Chinese, which seems to be a way to claim his membership in the adult group.

Perhaps because impressing the adults and being a member of the adult group is very important for Filip, he does not seem to attach equal significance to his relationship with different individual peers. Qualitative analysis suggests that Filip does not seem to be interested in an in-group/out-group distinction, which categorizes people into different groups and treats them discriminatively. For Filip, it seems that a peer is peer; it does not matter who they are. Even though he designates three boys (i.e., Deon, Vidal, and Frank)

as his best friends, he does not seem to treat his friends vs. non-friends in dramatically different ways. This is very different from Betty, for whom best friends are in a best friend group which should be treated separately and talked to differently.

It is worth noting that because Filip speaks English so little, it is very hard to figure out a pattern for when he speaks English. Possibly Filip speaks English when he infrequently steps out of his mini teacher's role, such as when he joins other people's conversations and play activities already being conducted in English, and when he is making reference to the peer culture when not in earshot of adults.

Elin – Situational Navigator

In the previous two sections, I have described Betty and Filip, two very influential members in the class, in terms of how they set up their distinctive leadership roles, what kind of social groups they had, how they recruited students for membership in their groups, and which language(s) they used to talk to different interlocutors in the classroom. To briefly recapitulate, Filip is the teacher's assistant. He almost always speaks Chinese during both academic and non-academic time, not only to the grown-ups but also to all the other children he encounters in the classroom. Filip's exclusive use of Chinese clearly has an impact on other children because they accommodate to his language choice and use more Chinese with him in both the academic and non-academic settings. Betty, in contrast, is a covert rebel in that she is observed to minimize her interaction with the teacher, speaking in Chinese in front of everybody else because she has to, but when she is off on her own, she becomes marginally subversive. She disobeys the rules by speaking a lot of English and sometimes gets other children in trouble and gets them to speak English.

In this section, I am going to look at the use of Chinese vs. English of a third student in this class – Elin, who is navigating a pathway between Betty and Filip. Based on what we have seen with Betty and Filip, we would expect to see Elin, like all the other students, use more Chinese when she is talking to and engaging with Filip, during both academic and non-academic time. On the other hand, since Elin designates Betty as one of her best friends, it also seems reasonable to expect to see her speaking more English with Betty, accommodating to Betty's language use whenever she hangs out with her.

The quantitative results generated by Rbrul mostly confirm this pattern. Let's take a look at what Rbrul tells us about how Betty, Filip and all the other interlocutors that Elin encounters in the classroom affect her language choice between Chinese and English during academic and non-academic time.

As with both Filip and Betty, the test of significance of random effects using a log-likelihood ratio test suggests that the interlocutor variable exerts a statistically significant impact on Elin's language choice during academic time. Table 6 below summarizes the output for Rbrul's mixed-effect logistic regression model of Elin's Chinese use during academic time – that is, during teacher-fronted instruction and interactive activities focused on Chinese language, math and science content, and also during homework time when Elin is doing written assignments mostly on Chinese language arts and math. (It's worth noting that no data were gathered from Elin during the health class because Elin was sick that day and stayed home.) As we can see from Table 6, the intercepts run all the way from 2.502 down to -2.24[7], which means that the

[7] Positive numbers promote Chinese and negative numbers promote English, and the significance of each number is noted in the right-hand column.

interlocutor variable has a highly variable degree of influence on Elin's use of Chinese vs. English. In fact, the range of variation in the degree of influence exerted by Elin's interlocutors, as shown by the intercepts in Table 6, appears to be much wider than that of either Betty's or Filip's interlocutors (Tables 2 and 4).

Table 6
Rbrul's mixed-effect model for Chinese use during academic time: **Elin**

ONE-LEVEL ANALYSIS OF RESPONSE Language use WITH PREDICTOR(S): Interlocutor [random, not tested] and On/Off Task (2.05e-05) + Task Content (0.00513) + Task Activity (0.0116)

$Task Activity					
Factor	log-odds	tokens	proportion (c/c+e)	uncentered weight	p-values
teacher-fronted instruction (f)	0.000	522	0.826	0.569	--
producing written assignment (w)	-0.337	657	0.486	0.485	0.11714
interactive activities (i)	-0.804	198	0.394	0.371	0.000114***
$Task Content					
Factor	log-odds	tokens	proportion (c/c+e)	uncentered weight	p-values
Chinese language arts (c)	0.000	552	0.612	0.54	--
math (m)	-0.201	760	0.603	0.49	0.18526
science (s)	-1.038	65	0.492	0.294	0.00317**
$On/Off Task					
Factor	log-odds	tokens	proportion (c/c+e)	uncentered weight	p-values
on task (o)	0.823	1166	0.655	0.531	< 0.0001***
off task (f)	0.000	211	0.303	0.332	--
$` Interlocutor (random)					
	intercept	tokens	proportion (c/c+e)	p-values	
Standard deviation	1.341	1377	0.601		
...	...	...	...		
researcher (r)	2.502	31	0.968	< 0.0001***	
homeroom teacher (t)	2.059	409	0.919	< 0.0001***	
Deon (d)	1.609	5	1		
Filip (f)	1.401	21	0.857	0.0083**	
Stella & Zoey (oz)	0.731	1	1		
Liz (l)	0.677	7	0.714		
Nikki & Filip (kf)	0.593	1	1		
children sitting around Elin during teacher-fronted instruction (7)	0.524	5	0.8		
Vidal (v)	0.482	4	0.5		
Betty & Stella (bo)	0.449	1	1		
self (s)	0.276	224	0.607	0.0454*	
Frank (c)	0.239	2	0.5		
Betty & Zoey (bz)	0.158	3	0.667		

Nikki (k)	0.15	5	0.4	
whole class (p)	0.106	31	0.548	
Evelyn (y)	0.033	88	0.455	
Betty (b)	-0.217	190	0.411	
Jasen (x)	-0.252	33	0.394	
Wayne (w)	-0.278	19	0.474	
Stella (o)	-0.394	7	0.286	
John (j)	-0.404	7	0.429	
Andrea (a)	-0.523	1	0	
Deon & Vidal (dv)	-0.546	2	0	
Zoey (z)	-0.581	157	0.344	0.0006***
Group members – Zoey, Evelyn, Brian & Jasen (g)	-0.599	60	0.35	0.0267*
Brian (n)	-0.997	27	0.259	0.0157*
Brian & Evelyn (ny)	-1.116	2	0	
Brian & Zoey (nz)	-1.583	4	0	
Andrea & Betty & John (abj)	-2.048	9	0	0.0108*
Evelyn & Zoey (yz)	-2.24	21	0	0.0032**

$misc.1

n	df	intercept	overall proportion	uncentered input probability
1377	7	-0.17	0.601	0.523

$misc.2

log-likelihood	AIC	AICc	Dxy.fixed	Dxy.total
-727.359	1468.718	1468.8	0	0.637

R2.fixed	R2.random	R2.total
0.044	0.338	0.382

In Table 6, those interlocutors with p-values smaller than 0.05 significantly promote Elin's Chinese language use during academic time; they are the researcher, the homeroom teacher, Filip and self, in that order. Although Elin does not speak a tremendous amount of language with the researcher, the proportion of Chinese that she uses with the researcher is the highest among all the interlocutors she talks to during academic time (0.968). The homeroom teacher as interlocutor is the second strongest promoter of Elin's use of Chinese in the academic setting, and also the one with whom she produces the most language. The third strongest promoter of Elin's use of Chinese during academic time is the mini teacher Filip. After Filip there is a drop in terms of both number of tokens and amount of influence until we get to self as interlocutor – in other

words, when Elin is using private speech, talking aloud to herself, she is significantly likely to do so in Chinese though somewhat less likely than with the first 3 interlocutors above.

At the bottom of the list of interlocutors, we see interlocutors who significantly promote Elin's use of English during academic time. These are her group members: Zoey (also one of Elin's designated best friends), Brian, Evelyn-and-Zoey as a subgroup, and the whole group together (Evelyn, Zoey, Brian and Jasen). Elin's other group members and combinations of group members, such as Jasen, Brian-and-Evelyn as a subgroup, Brian-and-Zoey as a sub group also promote her English language use somewhat during academic time, although their degrees of influence are not statistically significant. Evelyn is the only group member who does not promote Elin's use of English during academic time. Betty's whole group together (that is when Andrea, Betty, and John are together as Elin's addresses) also strongly promotes Elin's English language use during academic time. Betty, Elin's designated best friend and the leader of their friendship cluster, promotes Elin's use of English somewhat during academic time, although not at a statistically significant level.

Table 7 shows Elin's Chinese and English use during non-academic time – that is, during transitions, recess and snack time. A measure of significance of random effects using a log-likelihood ratio test shows the interlocutor variable exerts a statistically significant impact on Elin's use of Chinese and English. The output for the Rbrul mixed-effect logistic regression model of Elin's Chinese language use during non-academic time

shows that the intercepts run all the way from 2.121 down to -1.829[8], which indicates a wide range in the degree of influence of the interlocutor variable on Elin's use of Chinese vs. English during non-academic time.

Table 7
Rbrul's mixed-effect model for Chinese use during non-academic time: **Elin**

ONE-LEVEL ANALYSIS OF RESPONSE Language use WITH PREDICTOR(S): Interlocutor [random, not tested] and Activity (2.23e-06)

$ Activity					
Factor	log-odds	tokens	proportion (c/c+e)	uncentered weight	p-values
recess (r)	0.000	338	0.488	0.58	--
transitions (t)	-0.061	194	0.495	0.565	0.799
snack time (s)	-1.319	160	0.162	0.27	< 0.0001***
$` Interlocutor (random)					
	intercept	tokens	proportion (c/c+e)	p-values	
Standard deviation	1.269	692	0.415		
...	...	...	...		
researcher (r)	2.121	17	0.941	0.0006***	
homeroom teacher (t)	1.962	81	0.852	< 0.0001***	
microphone (m)	1.647	5	1	0.0486*	
Vidal (v)	1.437	10	0.8	0.0221*	
Deon & Wayne (dw)	1.4	12	0.833	0.0190*	
Deon & Filip (df)	1.265	3	1		
Betty & Deon & Wayne (bdw)	1.011	2	1		
Filip (f)	0.899	68	0.618	0.0003***	
Deon (d)	0.79	26	0.654	0.0416*	
Filip & Mia & Brian & Wayne (finw)	0.658	1	1		
Betty & Zoey (bz)	0.648	7	0.571		
Deon & Filip & Vidal (dfv)	0.641	1	1		
Filip & Vidal (fv)	0.641	1	1		
Stella (o)	0.307	6	0.5		
Nikki (k)	-0.033	33	0.242		
Zoey (z)	-0.09	31	0.29		
Liz (l)	-0.11	5	0.4		
Wayne (w)	-0.122	24	0.292		
Brian (n)	-0.148	17	0.353		
group members – Zoey, Evelyn, Brian & Jasen (g)	-0.155	13	0.385		
Jasen (x)	-0.187	27	0.259		
Betty & Stella (bo)	-0.233	1	0		
Evelyn & Zoey (yz)	-0.233	1	0		

[8] Positive numbers promote Chinese and negative numbers promote English, and the significance of each number is noted in the right-hand column.

Evelyn (y)	-0.246	41	0.317	
Deon & Filip & Vidal (dfv)	-0.268	11	0.364	
Betty & Filip (bf)	-0.443	7	0.286	
whole class (p)	-0.458	43	0.302	
Brian & Wayne (nw)	-0.503	1	0	
Deon & Brian & Wayne (dnw)	-0.518	1	0	
Betty & Stella & Zoey (boz)	-0.647	4	0	
Mia & Liz & Wayne & Zoey (ilwz)	-0.647	4	0	
Betty (b)	-0.821	133	0.195	0.0002***
Frank (c)	-0.83	2	0	
Frank & Deon & Filip & Brian & Vidal (cdfnv)	-0.83	2	0	
Mia (i)	-1.115	13	0.154	
John & Nikki (jk)	-1.193	4	0	
Frank & Deon & Liz & Brian & Vidal (cdlnv)	-1.224	4	0	
John (j)	-1.544	9	0	
self (s)	-1.829	21	0.048	0.0037**

$misc.1

n	df	intercept	overall proportion	uncentered input probability
692	4	-0.227	0.415	0.366

$misc.2

log.likelihood	AIC	AICc	Dxy.fixed	Dxy.total
-386.405	780.81	780.868	0	0.642

R2.fixed	R2.random	R2.total
0.058	0.309	0.367

Table 7 shows quite a few interlocutors whose p-values are smaller than 0.05, thus exerting a statistically significant effect on Elin's choice of Chinese or English during non-academic time. Notice that the researcher still locates at the very top of the interlocutor list as most strongly promoting Elin's Chinese language use during non-academic time, with the homeroom teacher being the second strongest promoter of her Chinese. Elin seldom speaks to the microphone, but when she does, the mic is a strong promotor of Chinese. Following the microphone, some children strongly promote Elin's use of Chinese during non-academic time: Filip and his friends, either alone or as a group.

Only two interlocutors at the bottom of the table strongly promote Elin's use of English during non-academic time. One is her designated best friend and leader of the girl group, Betty, and the other is *self*. Elin produces the largest amount of tokens with Betty; she also produces a very high proportion of her English language use with Betty. In comparison, Elin produces few tokens with her other two designated friends Stella and Zoey, and they do not exert any significant effect on her use of either English or Chinese during non-academic time. Whereas *self* (private speech) significantly promotes Elin's use of Chinese during academic time, it has the opposite effect during non-academic time, significantly promoting Elin's English. It may be important to note that this effect of *private speech* on Elin's language choice during academic and non-academic time is the same as for Betty (Tables 2 and 3).

To summarize, Tables 6 and 7 show that the teacher and the researcher significantly promote Elin's use of Chinese during both academic and non-academic time. Filip, the "mini teacher," also significantly promotes Elin's use of Chinese in both contexts; some of Filip's friends also encourage Chinese though to a lesser extent. Although Betty has the same group of peers that strongly promote her use of English during both academic and non-academic time, Elin has different groups of children who strongly promote her use of English in both contexts. Whereas Elin's group members significantly promote her use of English during academic time, Betty is the only peer who significantly promotes her English use during non-academic time.

The following section uses transcripts to provide more detail on Elin's Chinese and English language use in her interactions with different interlocutors during academic and non-academic time.

Elin's Interaction with the Homeroom Teacher

The homeroom teacher, as interlocutor, strongly promotes Elin's use of Chinese during both academic and non-academic time. Example 41 illustrates how, during academic time, Elin actively participates in teacher-fronted instruction, answering the teacher's questions in Chinese. Example 42 below documents the way, unlike Filip and Betty, Elin frequently checks with the teacher in Chinese to make sure that she is correctly following the teacher's instructions.

Example 41. 3/12/2020. Content: Chinese language arts. Context: Teacher-fronted instruction. Topic: *What pet do you want to have?*

1. T	na **Jasen**, **Jasen** zhen cong ming a! 那 Jasen, Jasen 真 聪 明 啊! *well Jasen, Jasen is so smart!*
2.	suo yi [zhen shen me shen me a! 所 以 [真 什 么 什 么 啊! *so* [*zhen what what a!* ((teacher introducing the structure "zhen … a!", which means "so" "really" "truly" or "indeed", showing exclamation))
3. Filip	[°°° ta mei you. °°° ((murmuring to himself)) [°°° 他 没 有. °°° [°°° *he's not.* °°°
4. Elin	wo zhen gao a! ((jumping up from the carpet in excitement)) 我 真 高 啊! *I am so tall!*
5. T	ai ni zhang de zhen gao a! 哎 你 长 得 真 高 啊! *yeah you are so tall!*

Example 42. 3/5/ 2020. Content: Math. Context: Morning reading; producing written assignments.

1. Elin	°° ba xia mian yi (2) zu de er fen zhi yi tu lv se. °° (4) °° 把 下 面 一 (2) 组 的二 分 之 一涂绿色.°° (4) °° *color half of the group below green.* °° (4)

((reading word problem))

2. zhe ge wo men ke yi tu lv se ma?
这 个 我 们 可 以涂绿色 吗？
this one do we need to color it green?

3. T ni ke yi bu yong tu.
你可 以不 用 涂.
you don't have to color it.

During non-academic time, Chinese is the language Elin uses almost exclusively to speak with the homeroom teacher. Example 43 illustrates the way she uses Chinese to ask the teacher for permission or make a polite request to do things.

Example 43. 3/11/ 2020. Context: Recess.

1. Elin wo men ke yi wan zhe ge jian zi ma?
我 们 可以 玩 这 个 毽 子 吗？
can we play jian zi?

2.T jian zi a, wo deng yi xia qu jie a.
毽 子啊, 我 等 一 下 去 借 啊.
jian zi, in a minute I'll go and borrow it.

Elin speaks English to the homeroom teacher very rarely. When she does, it is generally in one of the following three circumstances: (1) saying in English a word or a chunk whose Chinese equivalent she doesn't know or cannot come up with at the moment of speaking (Example 44 below), (2) making cross linguistic identification during teacher-fronted instruction (Example 45 below), and (3) using "wait" as a discourse filler which functions a filled pause when she is reflecting on or correcting an earlier topic (Example 46 below).

In Example 44, a group of children are playing with toy bricks together in the corner during recess. Wayne, who is not playing, is interrupting and teasing the other children, trying to bump their heads with his hand. In lines 2 and 4, both Betty and Elin

address the teacher to tell on Wayne. Whereas Betty speaks to the teacher completely in Chinese, in line 4 Elin includes quite a few English words; line 4 is coded as an English-based mixed-code utterance because it uses an English morpho-syntactic frame. The alert reader will notice that the teacher does not completely tolerate Elin's use of English, perhaps because the Chinese word for "head" is a very basic word that everybody should know; in lines 5-6, she reprimands Elin, and in line 7 she asks the group for the Chinese word for "head". In line 8, Betty says "tou" and in line 9, Elin repeats it.

Example 44. 3/4/2020. Context: Recess.

1. T	**Wayne** ni de shou! Wayne 你的 手! *Wayne your hand!*
2. Betty	ta zai peng bie ren de tou! 他在 碰 别 人 的 头! *he's touching someone else's head!*
3. T	A! **Wayne**! 啊! Wayne! *ah! Wayne!*
4. Elin	teng lao shi, wei en **bump** wo **in the head**! 滕 老 师, 炜 恩 bump 我 in the head! *Ms. Teng, Wayne bumped me in the head!*
5. T	ai **Elin**, na ge **Betty** jiu zhi dao ta zai peng wo de tou, 哎 Elin, 那个 Betty 就 知 道 他 在 碰 我 的头, *hey Elin, Betty knows he is touching my head,*
6.	dao ni na'er jiu bu zhi dao zen me shuo zhe ge **head** de ci le. 到 你 那儿 就 不 知 道 怎 么 说 这 个 head 的词了. *but as for you, you don't know how to say the word for head in Chinese.*
7.	**head** yong zhong wen zen me jiang a? head 用 中 文 怎 么 讲 啊? *how to say head in Chinese?*
8. Betty	tou!

头！
head!

9. Elin tou.
头.
head.

10. T zhuang wo de tou.
撞 我 的 头.
bump my head.

In Example 45, the teacher is asking the whole class what "zhi you" means during math instruction. In line 2, Wayne translates it into English, and in line 3, Elin repeats after Wayne.

Example 45. 3/5/2020. Content: Math. Context: Teacher-fronted instruction.

1. T zhi you shi shen me yi si?
只 有 是 什 么 意思？
what does zhiyou means?

2. Wayne `only one

3. Elin only one

Example 46 below shows Elin using "wait" as a discourse marker when she speaks to the teacher during teacher-fronted instruction in math. In line 1, the teacher asks the children to find the fraction card with 6/6 on it. Elin has trouble finding the card, so she first uses the English discourse marker "wait" and then asks the teacher in Chinese about the color of the card. In fact, Elin uses "wait" as a discourse marker more often than Betty or Filip seem to in situations such as this, perhaps transferring her English pragmatic knowledge into her use of Chinese.

Example 46. 3/12/2020. Content: Math. Context: Teacher-led activity – comparing fractions with fraction cards. Topic: *Equivalent fractions.*

1. T liu fen zhi liu, you mei you a?

六 分 之 六, 有 没 有 啊?
six sixths, do you have that?

2. Elin **wait,** liu fen zhi liu shi shen me yan se?
wait, 六 分 之六 是 什 么 颜 色?
wait, what color is six sixths?

3. T shi tian lan se de. zhe zhong lan de, xiang tian kong yi yang de.
是 天 蓝色的. 这 种 蓝 的, 像 天 空 一 样 的.
it's sky blue. This kind of blue, like the sky.
((teacher showing the card of 6/6 to the children))

Elin's Interaction with the Researcher

Elin's interaction with the researcher significantly promotes her use of Chinese during both academic and non-academic time. She almost always speaks to the researcher in Chinese. In Example 47 below, during academic time, Elin goes to the researcher's desk in the back of the classroom to ask questions in Chinese about her assignments. Example 48 shows she also uses Chinese during non-academic time to ask the researcher for permission to do things.

In Example 47, the children are completing and correcting their math assignments after teacher-fronted instruction. Elin forgets the solution to a word problem, so she seeks help from the researcher, using only Chinese.

Example 47. 3/4/2020. Content: Math. Context: Producing written assignment.

1. Elin zhe ge wo wang ji le zen me zuo.
这 个 我 忘 记了 怎 么做.
I forgot how to do this one.

2. Researcher na ge, zhe ge bu hui zuo ya?
哪个, 这 个 不 会 做 呀?
which one, you don't know how to do this one?

3. Elin zhe ge.
这 个.

this one.

4. Researcher ma ding chi le si fen zhi yi ge da bi sa bing. na ge da?
马 丁 吃了四 分 之 一个 大比萨 饼. 哪个大?
Martin eats one fourth of the large pizza. Which one is larger?
((Elin pointing to the larger pizza))

5. ta chi le duo shao?
他 吃了 多 少?
how much did he eat?

6. Elin yi ge da::
一个大::
one big::

7. Researcher si fen zhi [yi ge.
四分 之 [一个.
one [forth.
((researcher pointing to the picture and showing Elin what one forth looks like))

[si fen zhi yi.
8. Elin [四分 之 一.
[*one forth.*

Example 48 shows how during non-academic time, Elin also speaks to the researcher entirely in Chinese to ask for permission to drink some water.

Example 48. 3/9/2020. Context: Recess.

1. Elin wo ke yi qu he shui ma?
我 可 以去 喝 水 吗?
can I go and drink some water?

2. Researcher qu ba qu ba.
去 吧 去吧.
go go.

On the rare occasions when Elin speaks to the researcher in English, it is usually when she does not know the Chinese equivalence, as in Example 49, when she and Betty come to the researcher and she asks in Chinese for permission to go to the imagination

fair to get name tags. However, Elin doesn't know how to say "imagination fair" in Chinese, so she switches to English.

Example 49. 3/9/2020. Context: Transition.

1. Elin liu lao shi, wo he bei di yao qu zhe ge **imagination fair**.
刘 老 师，我 和 贝 蒂 要 去 这 个 imagination fair.
Ms. Liu, Betty and I need to go to the imagination fair.

2. Researcher ji dian a?
几 点 啊?
when?

Self as Interlocutor (Elin's Private Speech)

Tables 6 and 7 above show that *self* as Elin's interlocutor, or *private speech*, exerts a statistically significant effect on her language choice in two opposite directions depending on whether it is academic or non-academic time. We can gain insights into factors affecting that choice by looking at the examples below. In Examples 50, 51, and 54 below Elin uses Chinese to speak to herself out loud during academic time; Examples 52 and 53 show two exceptions. Where Betty produces a lot of private speech in Chinese in the form of vicarious responses, covert repetitions, and language play, these are rarely observed with Elin. Example 55 below shows Elin's use of English to speak to herself during non-academic time. This effect of self as interlocutor on Elin's use of Chinese vs. English is very similar to that of Betty (Tables 2 and 3) (although with fewer than half the tokens Betty produced).

During academic time, Elin talks to herself primarily during homework time. Example 50 shows how when she is doing her assignment, she reads the Chinese medium reading comprehension questions and math problems she is working on out loud to herself. In Example 51, she murmurs aloud the Chinese characters/words she is writing.

In Example 50, Elin reads out loud to herself in Chinese a word problem she is working on. When she encounters characters that she does not know how to read, she simply skips them or babbles. The entire word problem in Example 50 is "Martin ate one fourth of a large pizza. May ate one fourth of a small pizza. Did they eat the same?" Elin does not seem to know the Chinese characters for pizza (披萨饼) and May (梅), so she either skips reading those characters or babbles, as represented by "-" and "(…)" in the transcript.

Example 50. 3/4/2020. Content: Math. Context: Producing written assignment.

1. Elin °° ma ting chi le si fen zhi yi ge da -, °°
°° 马 丁 吃了四 分 之一个 大-, °°
°° *Martin eats one fourths of a big -,* °°

2. °° (…) chi le si fen zhi yi ge xiao (…). °°
°° (…) 吃了四 分 之一 个 小 (…). °°
°° *(...) eats one fourth of a small (...).*°°

In Example 51, Elin is making up her own sentence based on a picture in a Chinese Activity Book. Example 51 shows that while Elin is writing her sentence, she murmurs to herself in Chinese to self-regulate her production and learning of Chinese writing (Lantolf, 1997).

Example 51. 3/5/2020. Content: Chinese language arts. Context: Producing written assignment.

1. Elin °° ge ge zai {wan:: (2)} wan:: shang:: qu:: pao:: bu. °°
°° 哥 哥 在 {晚:: (2)} 晚:: 上:: 去:: 跑:: 步.°°
°° *older brother run::s at:: {ni:: (2)} ni::ght.* °°

During academic time, whenever she is solving math problems, Elin is observed to speak to herself to regulate her thinking. In contrast to her usual pattern, this occurs mostly in English, although sometimes it is in Chinese too when the numerical problem

does not have a heavy cognitive load or the math problem is not a numerical problem at all. Example 52 is a typical example of Elin speaking to herself in English when she is processing numerical problems. This problem asks children to use quarters, dimes, nickels and pennies that add up to $1.28. As we see in Example 52, Elin relies completely on English to do the calculation, and all of her "metacomments" (e.g., "so that would be", "if I", "if three") are in English. According to Cohen (1994, p. 181), such metacomments may indicate "a planning and evaluation function, typical of higher forms of cognition" and would suggest that English metacomments like these indicate that Elin's cognitive problem solving is being done completely in English.

Example 52. 3/5/2020. Content: Math. Context: Producing written assignment.

1. Elin	°° six quarters (1) six quarter:::s (1) °°
2.	°° six quarters so that would be (10) °°
3.	°° twenty-five fifty seventy five (5) °°
4.	°° if I:: (5) °°
5.	°° If three:: (16) °°

Qualitative analysis shows that Elin shifts from Chinese to English as soon as she finishes reading math problems out loud in Chinese and starts to solve them. In Example 53, Elin is working on the math problem shown in Figure 3. In lines 1 and 2 Elin reads the word problem out loud to herself in Chinese, but in line 3 as soon as she starts to solve the problem she switches to English, probably to self-regulate her thinking. As in Example 52, Elin's metacomments in Example 53 (i.e., "that would be" and "oh jeeze!") are also in English.

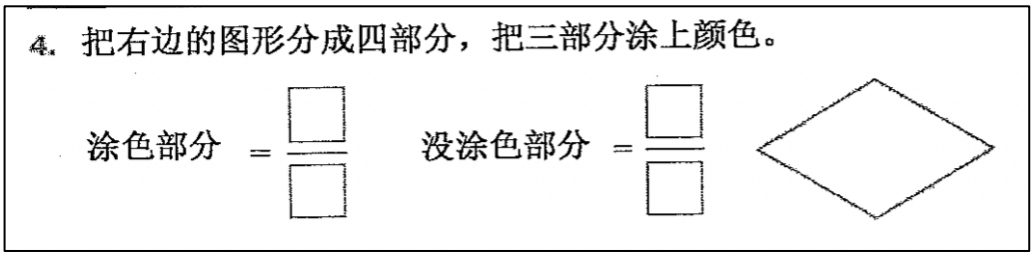


Figure 3
The math problem Elin is working on in Example 53

Example 53. 3/5/2020. Content: Math. Context: Producing written assignment.

1. Elin °° ba you bian de tu xing fen cheng si bu fen,°°
°° 把 右 边 的图 形 分 成 四部 分,°°
°° *divide the shape on the right into four parts,* °°
((reading the word problem))

2. °° ba san bu fen tu yan se. °°((reading the word problem))
°° 把 三 部 分 涂 颜 色.°°
°° *apply color to three parts.* °°

3. °° that would be four of three and four (…) one. oh jeeze！ °°

Elin's language use in Examples 52 and 53 seems to support Swain and Lapkin's (1998) claim that when immersion children are working on tasks that seem to be cognitively demanding, they start to use their first language to mediate their learning.

However, when the math problem is not a numerical problem or when the cognitive load of the problem is very light, Elin is observed to speak to herself in Chinese. In Example 54, Elin is working on the math problem shown in Figure 4. This math problem is not a numerical problem; it asks children to circle the shape which has only one line of symmetry. This apparently does not require much cognitive effort on her part. In lines 1 and 2, Elin reads the word problem out loud to herself in Chinese, and then in line 3, she speaks to herself entirely in Chinese to self-regulate her thinking while drawing symmetry lines on these shapes.

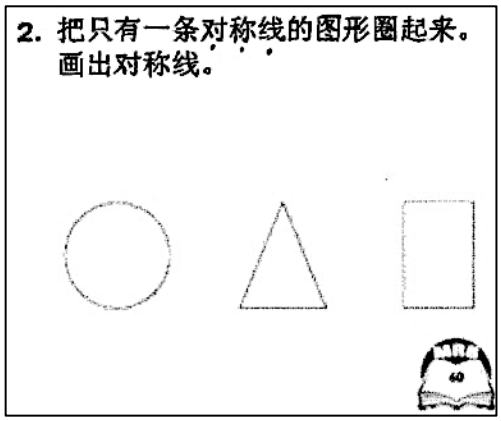


Figure 4
The math problem Elin is working on in Example 54

Example 54. 3/5/2020. Content: Math. Context: Producing written assignment.

1. Elin °° ba (…) you yi tiao dui chen xian -°°
°° 把 (…) 有 一 条 对 称 线- °°
°° *make (...) only one symmetry line*-°°
((reading the math problem, yawning))

2. °° dui cheng xian °°((keeping reading the math problem))
°° 对 称 线 °°
°° *symmetry line* °°

3. °° zhe ge, zhe ge, zhe ge, zhe ge, zhe ge, zhe ge, zhe ge, zhe ge, zhe ge. °°
°° 这 个, 这 个, 这 个, 这 个, 这 个, 这 个, 这 个, 这 个, 这 个.°°
°° *this, this, this, this, this, this, this, this, this.* °°
((drawing symmetry lines on the shapes))

During non-academic time, private speech significantly promotes Elin's use of English, and includes many vernacular words and phrases addressed to herself. The most frequent vernacular terms produced by Elin include *oh my gosh, whoops, what?! shoot, oh jeeze,* and *oh man.* In Example 55, Elin is drawing a picture at her desk during recess. In line 1, Evelyn asks Elin in English what she is drawing. In line 2, Elin addresses Evelyn in a mixed-code utterance, and then in line 3 she addresses herself in English, using a vernacular term: *oh my gosh.* Elin's volume shifts as she shifts from Evelyn to

self as addressee. There is a higher volume for *you can see after I am done,* when Elin is talking to Evelyn, and a lower volume for *oh my gosh! I think I forgot how to draw it,* when she uses private speech to address herself.

Example 55. 3/4/2020. Context: Recess.

1. Evelyn ni zai hua shen me?
你在 画 什 么?
what are you drawing?

2. Elin ni ke yi **see after** wo **done.** (5)
你可以 see after 我 done.(5)
you can see after I am done. (5)

3. °° oh my gosh! I think I forgot how to draw it. °°

Elin's Interaction with Peers

Quantitative results show that Filip is the only child who strongly promotes Elin's use of Chinese during both academic and non-academic time. Filip's friends (i.e., Vidal and Deon) also promote Elin's Chinese language use to a lesser extent during non-academic time when Elin hangs out with them in the activities that Filip organizes and leads. Elin's group members strongly promote her use of English during academic time, whereas Betty – the boss of the girl group, strongly promotes Elin's use of English during non-academic time. Elin also tends to use English with Betty during academic time but this trend is not significant. The examples below provide insight into such incidences.

We have said that Filip as interlocutor significantly promotes Elin's Chinese language use irrespective of whether it is in the academic or non-academic context. As the "mini teacher" of the class, Filip is observed to periodically warn Elin when he hears her speaking English (he does the same thing to Betty and other children too). In Example 56 below, the children are getting their snacks from their lockers in the hallway.

In line 1, Elin initiates a conversation with Filip in English, but before she finishes, in line 2, Filip jumps in and requests that Elin speak Chinese. In line 3, Elin switches right back to Chinese with "*it's har::d*".

Example 56. 3/4/2020. Context: Transition.

1. Elin	fei lin, **about the way we are-** 费林，about the way we are- *Filip, about the way we are-*
2. Filip	shuo zhong wen! 说　中　文！ *speak Chinese!*
3. Elin	shi hen nan::. 是 很 难:::. *it's har::d.*

During homework time, Elin is observed to switch to Chinese to talk to Filip whenever she seeks help from him. As we see in Example 57, Elin uses English when asking for help and talking to her peer group members Jasen and Evelyn in lines 1 and 5, but she switches to Chinese in line 6 to seek help from Filip when she sees him approaching.

Example 57. 3/4/2020. Content: Math. Context: Producing written assignment.

1. Elin	Jasen, how many of these is in this?
2. Jasen	I just did it, and I just forgot.
3. Evelyn	you could look back on your book.
4. Jasen	oh yeah.
5. Elin	this is hard.
6.	fei lin, fei lin, ni zuo wan le ma? ((Filip approaching)) 费林，费 林，你 做 完 了吗？ *Filip, Filip, are you done?*

7. Filip mei you.
没 有.
not yet.

When Filip is helping Elin with her assignment as a mini-teacher, Elin speaks with him entirely in Chinese; we see this clearly in Example 58. Here Filip is helping Elin on the following word problem: June has 15 fish in the fish tank, 1/3 is blue, how many blue fish are there in the fish tank?

Example 58. 3/11/2020. Content: Math. Context: Producing written assignment.

1. Filip {ni you (1) shi wu- hua shi wu- hua-} ni you shi wu ge yu gang:: .
{你 有 (1) 十 五- 画 十 五- 画- } 你 有 十 五 个 鱼 缸::.
{you have (1) fifteen- draw fifteen- draw-} you have fifteen fish tanks::.
((Filip is making a mistake here; apparently the word problem is "there are 15 fish in the fish tank", not 15 fish tanks))

2. {mei yi ge^ you^ (1) zai::} (1) zhe ge shi wu ge.
{每 一个^ 有^ (1) 在:: } (1) 这 个 是 五个.
{each one^ has^ (1) at::} (1) this is five.

3. {you wu ge shi::- lv^ shi^} (2) ((taking a breath))
{有 五 个 是::- 绿^ 是^} (2)
{there's five- green^ is^} (2)

4. {shi `san::}`san `fen `zhi `yi shi lv se de. [ji ge shi-
{是 `三::}`三 `分 `之 `一 是 绿色的. [几个是-
{it's `three::}`one `third is green. [*how many are-*

5. Elin [shi lan se de =
[是 蓝 色 的=
[*is blue* =

6. Filip = lan se de! ji ge shi lan se de? (1)
= 蓝 色的! 几个 是 蓝 色 的? (1)
= *blue! how many are blue? (1)*

7. wo shuo le. (1) {shen^ wu^} (2) shen me cheng san deng yu shi wu?
我 说 了. (1) {什^ 五^} (2) 什 么 乘 三 等 于 十 五?
I said. (1) {what^ five^} (2) what multiplies three equals to fifteen?

8. Elin °° san. °°
°° 三. °°
°° *three.* °°

9. Filip uh?

10. Elin san.
三.
three.

11. Filip san cheng san deng yu jiu! ((speaking sternly))
三 乘 三 等 于 九!
three multiplies three equals to nine!

12. Elin bu shi! san cheng wu deng yu =
不 是! 三 乘 五 等 于 =
no! three multiplies five equals to =

13. Filip = dui! shi wu.
= 对! 是 五.
= *right! it's five!*

14. {nis hi^} ni xie wu. (3) da an shi wu. ((Filip leaving Elin's group))
{你是^} 你 写 五. (3) 答案 是 五.
{you are^} you write five. (3) the answer is five.

From line 1 through line 4, Filip first paraphrases the word problem to Elin in Chinese. In line 5, Elin points out in Chinese that the color of the fish is blue not green. In line 6, Filip corrects his mistake in Chinese right away, and in line 7, he asks Elin a follow-up question in Chinese: what number multiplied by three equals fifteen? In line 8, Elin murmurs *three* in Chinese in a very low voice, indicating that she does not seem to be confident about her answer. Upon Filip's clarification request in line 9, in line 10 Elin repeats her answer *three* in Chinese again. Filip seems to be completely shocked by Elin making such a rookie mistake, so in line 11 he sternly and loudly points out in Chinese that three multiplied by three is nine. In line 12, Elin denies this right away and then

immediately adds in Chinese that three multiplied by five equals fifteen. In lines 13 and 14, Filip confirms with Elin in Chinese that the right answer is five and then he leaves Elin's group to help other children.

In general, Elin seems to view Filip as a kind of special friend at school. She is observed to pay special attention to whatever Filip says and does, and finds chances to chime in using Chinese in conversations that Filip joins or to initiate new conversations with him in Chinese during academic time.

In Example 59, during teacher-fronted instruction on Chinese language arts, the teacher is introducing the Chinese word for *bully* to the children. In order to have the children understand the meaning of the word, the teacher asks the children if they have ever been bullied by someone else. After the teacher asks her question, everybody tries to get a word in, sharing excitedly with the teacher or their neighbors their rich experience of being "bullied" by their siblings, especially their younger brothers and sisters. Just before the exchange in Example 59, Filip says Wayne pushed him. Among all kinds of complaints voiced at the same time, Elin still hears what Filip is saying, and then she chimes in and argues with Filip in Chinese, saying in lines 1, 3, 6 and 8 that it is Filip who bullied Wayne not the other way around. This example is interesting, because Elin and Filip argue in Chinese even though it would be very hard for the teacher to hear them talking due to the loud and lively sharing and discussion from all the other children.

Example 59. 3/11/2020. Content: Chinese language arts. Context: Teacher-fronted instruction.

1. Elin	{ni-} ni **hit** ta **when we were playing the balancing game.** {你-}你 hit 他 when we were playing the balancing game. *{you-} you hit him when we were playing the balancing game.* ((all children are excitedly sharing with the teacher and their neighbors))

2. Filip uh? =

3. Elin = ni:: qi fu wei en.
= 你::欺负 炜 恩.
= *you::bullied Wayne.*

4. @T lai ba! jin tian zao shang-
来吧！今 天 早 晨-
attention! this morning-

5. Filip {ni mei you^} wo mei you. =
{你 没 有^} 我 没 有.=
{*you didn't^} I didn't. =*

6. Elin = ni you! =
= 你 有! =
= *you did!* =

7. Filip ={wo^} wo zuo zhe ge.
={我^} 我 做 这 个.
={*I^} I did this.*
((Filip gesturing to Elin; all the children excitedly talking and sharing; the teacher clapping hands to get the children's attention))

8. Elin ni zuo zhe ge. ((gesturing))
你 做 这 个.
you did this.

In Example 60, during academic time, while all the other children are doing their math assignment, Filip finishes first so he goes to the corner of the classroom and plays. Elin, who keeps an eye on Filip, notices that he is looking for white paper. She stops doing her math problem, goes to Filip and tells him in Chinese that she has white paper if he wants it.

Example 60. 3/5/2020. Content: Math. Context: Producing written assignment.

1. Elin fei lin, wo you bai zhi. (1) wo you bai zhi.
费 林, 我 有 白 纸. (1) 我 有 白 纸.
Filip, I have white paper. (1) I have white paper.
((leaving her seat and going to talk to Filip))

During non-academic time, Elin hangs out with Filip a lot, joining in the activities that he organizes and leads. Sometimes she is only a peripheral participator in Filip's activities, but she also seems to enjoy simply watching Filip and his friends playing. During those activities, she almost always speaks Chinese with Filip and his friends. Interestingly, when Elin is playing with Filip, she is observed to ask Filip many confirmation questions in Chinese to make sure that she is following his rules, as we will see in Examples 61 and 62 below. This pattern is very similar to her patterns of interaction with the teacher, in which she also asks many confirmation questions in Chinese to ensure that she is following the teacher's instructions.

In Examples 61 and 62, Elin is playing with Filip and a group of other children with an Ozobot (a coding robot) that Filip has brought to school. Filip has been drawing routes of different colors for his Ozobot on a large piece of white paper and building barriers with toy blocks along the routes. Elin wants to play with Filip, so in Example 61, in line 1 she first asks Filip in Chinese for his permission to help him. In line 2, Filip registers his approval in Chinese. In line 3, Elin holds a few pieces of toy blocks in her hands, asking Filip in Chinese which barrier he is working on. After Filip tells her in Chinese in line 6 where he wants her to help with his construction, Elin confirms in Chinese with Filip in line 7. As soon as Elin gets an approval in Chinese from Filip in line 8, she places the toy blocks at the place where Filip wants her to.

Example 61. 3/5/2020. Context: Recess.

1. Elin ke yi bang wo ma?
   可以 帮 你 吗？
   can I help you?

2. Filip ke yi.

可以.
yeah.

3. Elin [ni zai zuo na yi ge? ((holding a few toy blocks in her hand))
[你 在 做 哪一个?
[*which one are you doing?*

4. Jasen [zhe ge ji qi ren shi hen hao wan.
[这 个机器 人 是 很 好 玩.
[*this robot is entertaining.*

5. Filip shi de. ((addressing Jasen))
是 的.
yeah.

6. fang zai zhe'er. ((addressing Elin))
放 在 这儿.
put it here.

7. Elin zhe li ma↑?
这 里 吗↑?
here↑?

8. Filip dui. (2)
对. (2)
yeah. (2)

A few minutes later, Filip starts to expand the territory for his Ozobot by drawing more routes of different colors. Elin is helping him. As Example 62 shows, Elin waits to draw a U-turn until she asks Filip and gets his permission to draw it. Throughout this example, Elin speaks Chinese almost exclusively.

Example 62. 3/5/2020. Context: Recess.

1. Elin wo men ke yi zuo zhe ge **U-turn** ma?
我 们 可以 做 这 个 U-turn 吗?
can we make a U-turn?

2. Filip hao, ke yi, wo hen [xi huan **U-turn**.
好, 可以, 我 很 [喜 欢 U-turn.
yeah, sure, I like [U-turn very much.

3. Elin [lan se hong se lan se. (5) ((drawing a U-turn))
[蓝 色 红 色 蓝 色. (5)
[*blue red blue. (5)*

4. lan se hong se.
蓝 色 红 色.
blue red.

The previous examples show that as an influential member in the classroom, Filip significantly promotes Elin's use of Chinese during both academic and non-academic time. In contrast, another influential member in the class, Betty, who is Elin's designated best friend and the leader of the girl group, significantly promotes Elin's English language use particularly during non-academic time. During academic time, Elin is also observed to speak a lot of English with Betty, often in situations very similar to ones where she mostly speaks Chinese with Filip.

First, during academic time, Elin tends to speak English with Betty. In Example 63, the children are doing their math assignment. Elin goes to Betty's group and asks how Betty has solved a particular math problem. In this short exchange, in line 1 Elin asks Betty in English, and in line 2 Betty also replies Elin in English. Then Elin takes a look at Betty's homework book and goes back to her seat.

Example 63. 3/12/2020. Content: Math. Context: Producing written assignment.

1. Elin can you do- how can you do the pants?
2. Betty that's what I did. ((showing Elin her notebook))

During academic time, in Example 64, the teacher asks the children to work in pairs to piece the geometric shapes in their math workbook with geometric pattern blocks. Elin and Betty work together as directed. The purpose of this activity is to prime the children for the content of their math instruction during that day; the teacher is letting

the children have some hands-on experience before she talks about the problem to the whole class. Not surprisingly, a lot of children, including Elin and Betty, find the task challenging. The two girls get stuck, so Elin goes to other groups to get some ideas. In Example 64, Elin starts to play with the pattern blocks to show Betty her findings; throughout, Elin and Betty speak entirely in English.

Example 64. 3/4/2020. Content: Math. Context: Interactive activity.

1. Elin	oh, I see it! ((running back))
2. Betty	yeah ↑ ?
3. Elin	I saw there's- ((trying with geometric pattern blocks))
4. Betty	o::k
5. Elin	it's something like that:: ↑ (3) ((keeping trying))
6.	no. (2) how was that again?
7. @Ss	yeah!!!
8. Betty	wait. they are really smart!
9. @T	kuai kuai, kuai kuai! 快　快，　快　快! *hurry hurry!*
10. Betty	they are really smart!

When Elin and Betty sit together on the carpet during teacher-fronted instruction, Elin almost always speaks English to Betty in a very low voice. In Example 65, the children are having their math lesson with the teacher on equivalent fractions. Before the interaction below, the teacher asked the children in Chinese to play a fraction game in pairs comparing different fractions with ½ using fraction flash cards. Elin and Betty worked together at that time, after some unpleasant negotiation among the clique

members. In Example 65, the two girls are having disputes about who should touch the cards and find the ones that the teacher asks for. Although in lines 1-6, they actively participate in Chinese during teacher-fronted instruction, competing loudly with other pairs to be the first to answer the teacher's questions, in lines 7 and 8 they switch to English to argue with each other in private about who should touch the cards and find the ones the teacher is asking for. (This example sharply contrasts with Example 59 above in which Elin speaks entirely in Chinses with Filip in their private conversation during teacher-fronted instruction.)

Example 65. 3/12/2020. Content: Math. Context: Teacher-fronted instruction. Topic: *Equivalent fraction.*

1. T	shi bu shi liu fen zhi liu? you mei you liu fen zhi liu? 是 不 是 六 分 之 六? 有 没 有 六 分 之 六? *is it six sixths? you got six sixths?*	
2. Elin	you! 有! *yeah!*	
3. Betty	you! 有! *yeah!*	
4. T	hao la, na ni men huan le, 好 啦, 那 你 们 换 了, *ok, well you guys changed your card,*	[na ni men zhe zu gei wo. [那 你 们 这 组 给 我. *[this group can give me your card.*
5. Elin		[wo men ke yi zuo ma? [我 们 可 以 做 吗? [*can we do it?*
6. T	yi ge xiao yu, yi ge deng yu, yi ge da. 一 个 小 于, 一个 等 于, 一个大. *one smaller than ½, one equals to ½, one bigger than ½.*	
7. Betty	°°ok. stop! I can do it. next time you- let me- me, you, me, you, me, you.°°	

8. Elin °°so you do that, I will do this one, and then we trade.°°

During non-academic time, Elin almost always speaks English with Betty. Mostly in snack time, Elin hangs out with Betty and the other two girls of the friendship clique. (Elin doesn't play with the girls' group as much during recess, because that is usually when she plays with Filip and his friends in the corner.) When she hangs out with the girl group, she is observed to sit closely to the other girls, speaking entirely in English with them. Example 66 is a typical example of the kind of interaction that occurs between Elin and the other members of the friendship cluster during snack time. In this example, the four girls are snuggling together on the carpet (with Betty sitting in the middle), eating snacks, and watching the Chinese version of the animation *Avatar: The Last Airbender.* While watching, they comment on the characters in the cartoon every now and then, all of them speaking entirely in English.

Example 66. 3/12/2020. Context: Snack time.

1. Elin they both have a black eye. (5)
2. Stella his eye is purple.
3. Betty whose eye? (2) I can't blink so.
4. Zoey I can.
5. Stella I can't.
6. Betty I can't
7. Zoey I can't.
8. Elin uh?
9. Betty I can't blink.
10. Elin you mean wink?
11. Betty yeah, wink. I can blink, I can't wink.
12. Elin do it.
13. Betty I can't wink.
14. Zoey I can wink with both eyes.
15. Elin no.

My classroom observations suggest that Elin cares a lot about what Betty thinks and feels, and she takes a protective stance when other girls showing interest in joining

Betty's friendship group, as shown by Examples 67 and 68. Example 67 shows that when Nikki was doing a survey, asking everybody to choose a movie they liked better, *Rack it Ralph* or *the Jungle Book*, Elin first asked Nikki what Betty had chosen, and then she made the same choice Betty did. Thus, Elin identifies with Betty, and one way to show her personal identification with Betty may be to switch to English when talking to her.

Example 67. 3/4/2020. Context: Snack time.

1. Elin what did eh Betty do?
2. Nikki Wreck it Ralph.
3. Elin ok, yeah, I'll do Wreck it Ralph.

In Example 68, Evelyn asks Elin if she could get partnered with Betty to do the next academic activity. However, Elin flatly refuses Evelyn's proposal without any hesitation, saying "I told you" in English in a very impatient manner. This example shows, first of all, the exclusive nature of this friendship clique, and second, Elin's status as a controlling member of this girl group. Always speaking English with Betty and the other two girl members may be one way to claim membership and establish a place in this friendship clique.

Example 68. 3/12/2020. Context: Snack time.

1. Evelyn let me get to partner with Betty =
2. Elin = I told you. ((saying very impatiently))

Even though Elin speaks Chinese with Filip and English with Betty, when all three of them are in a group, Elin's use of Chinese vs. English becomes less predictable. In Example 69 below, the three children are reading a few Chinese passages together as a group upon the teacher's request. Elin speaks several times in this example, switching

back and forth between English and Chinese in ways that sometimes violate her usual pattern of only using Chinese with Filip, as we see in lines 3, 7, 8, 10, 18 and 24.

Example 69. 3/4/2020. Content: Chinese language arts. Context: Reading passages in small groups.

1. Betty **ok**! wo men du ba!
ok! 我 们 读吧！
ok! let's read!

2. Filip shi liu. ((turning to page 16))
十 六.
sixteen.

3. Elin [hey, where did my pencil go? ((addressing Betty))

4. Filip [shu shu gei wo mai sheng ri li wu ((Filip starting reading the passage))
[叔 叔 给 我 买 生 日礼物
[*uncle bought me present gift*

((all three start reading the passage; transcripts of them reading the passage omitted))

5. Filip sheng ri- = ((reading the passage))
生 日- =
birthday- =

6. Betty = yao **check it off.**
= 要 check it off.
= *should check it off.*

7. Elin Filip, can I sit there? (1) Filip, can I sit there?

8. o fei lin wo ke yi zuo zai zhe'er ma?
哦费 林 我 可 以 坐 在 这 儿 吗？
oh Filip can I sit here?

9. Filip uh？

10. Elin wo ke yi zuo zai zhe'er ma?
我 可以 坐 在 这 儿吗？
can I sit here?

11. Filip ke yi, deng yi xia. (3)
可以，等 一下. (3)
sure, wait a minute. (3)

12. Betty ni zuo shen me? (3) **ok,** di di:: = ((starting to read))
你做 什 么? (3) ok, 弟弟:: =
what are you doing?(3) ok, brother::=

13. Filip = hao.
= 好.
= *ok.*

14. Elin eh:::: ((looking at what page Betty is at))

15. Betty shi ba ye. ((addressing Elin))
十 八页.
page eighteen.

16. Filip zui hao de li wu ((reading the passage))
最 好 的礼 物
best gift

17. Betty zui hao de li::- ((reading the passage))
最 好 的礼:: -
best gif::-

18. Elin are we supposed to read this ↑？ ((addressing Filip and Betty))

19. Filip [bu yao.
[不 要.
[*no.*

20. Betty [**wait,** {ni ke yi zuo- zhe ge shi-} zhe ge shi eh zi ji xuan yi ge.
[wait, {你可 以 做- 这 个 是-} 这 个 是 eh 自己 选 一个.
[*wait, {you can do- this is-} this is eh we choose one by ourselves*.

21. Filip dui, {wo men-} zhe shi wo men de [yao xuan yi ge.
对, {我 们-} 这是 我 们 的 [要 选 一个.
right, {we-} this is our [choosing one by ourselves.

22. Betty [zi ji xuan yi ge.
[自己 选 一 个.
[*choosing one by ourselves.*

23. Filip dui.
对.
right.

24. Elin o `zhe ge shi wo men de zi ji xuan yi ge! ((addressing Filip and Betty))
哦`这 个是 我 们 的自己 选 一个!
oh `this is our choosing one by ourselves!

25. Filip o dui! tai rong yi!
哦对! 太 容 易!
oh right! so easy!

In line 3, Elin asks Betty in English if Betty knows where her pencil is. After Betty suggests in line 6 in a Chinese-base mixed utterance that they should all check off the passage that they have just finished reading, in line 7, Elin asks Filip twice in English if she can sit on the stool where Filip leaves his notebook. In line 8, Elin suddenly switches to Chinese to say the same thing to Filip again. In line 10, Elin repeats her request in Chinese upon Filip's Chinese clarification request. When Filip and Betty move on to the next passage, Elin, in line 18, interrupts and addresses both in English, asking if they are supposed to read a particular passage. Through lines 19 to 23, Filip and Betty discuss almost entirely in Chinese whether they should or should not read the passage. In line 24, Elin uses Chinese to join Betty and Filip's discussion and confirm with them which passage they are supposed to read.

As we see from this example, Filip speaks Chinese exclusively and Betty accommodates to Filip's language of choice by almost always speaking Chinese in the group. However, Elin switches back and forth between English and Chinese to both of them. At this point of my analysis, it's not clear whether there is a pattern of Elin's language choice when she is with both Filip and Betty together because clearly she does not speak to Filip entirely in Chinese, nor does she speak to Betty entirely in English, and

she uses both languages when addressing both of them. What is clear, however, is that there is a lot of code switching going on in her language use when her audience is both Betty and Filip. Perhaps she wants to be loyal to both of these class leaders and tries to maintain balance by using both languages, but she just can't keep them straight so that she always speaks Chinese to Filip and switches to English to talk to Betty. Apparently, her smooth pattern of accommodating to whoever she is with gets all messed up when she addresses both leaders together.

It's worth noting that although Betty seems to accommodate to Filip's language of choice by speaking a lot of Chinese in this group, she code-switches a few times in lines 1, 6, 12, 20. She seems to use code-mixed language more than when just addressing Filip outside this group, when she sticks to Chinese. Betty seems to use more Chinese with Elin in this group than she does outside it.

Summary of the Interlocutor Effect on Elin's L1 and L2 Use

Findings show that Elin almost always speaks Chinese with adults (i.e., the homeroom teacher and the researcher) and with Filip during both academic and non-academic time. But when she is talking to Betty, the leader of the girl group, she tends to use a lot more English in both the academic and the non-academic contexts.

Qualitative analysis suggests that Elin makes a lot of language accommodation when she is talking to the two peer leaders Filip and Betty. When she is with just Filip, she is clearly a follower, paying special attention to what Filip says and does, obeying the rules that Filip sets up and accommodating to his needs, including speaking Chinese, the language that Filip speaks. When she is with just Betty, she clearly switches to English, accommodating to Betty's language of preference and seemingly claiming membership in

Betty's friendship clique. While she seems to smoothly navigate a safe pathway between Filip and Betty when she is with either Filip or Betty, her navigation suffers some sudden hardship when she has to speak to both leaders at once. As we have seen from the previous examples, when the three of them are in the same group and the two leaders conflict with each other in their language of preference, Elin is caught off guard. She does not seem to have a system for choosing either Chinese or English; if she chooses Chinese that would reject Betty and if she chooses English that would reject Filip, and clearly she doesn't want to reject either one because she starts to code-switch in a way that at present seems somewhat disorganized.

Elin's code-mixing in the group does not seem to affect Filip much, but it may influence Betty's language use, and vice versa. Betty accommodates to Filip's language choice by speaking a lot of Chinese, but like Elin, she seems to mix languages more than when she is only talking to Filip. It is unclear which of the girls initiates this code-switching, but perhaps once it gets started, they are accommodating to each other by continuing it.

Key Findings for Research Question 1

The first research question examined the interlocutor effect on the three focal children's use of Chinese and English in the classroom. The study findings showed that the three children's language use was significantly affected by the interlocutors they talk to. Three types of interlocutors were identified as strongly affecting the focal children's language choice: namely the homeroom teacher and the researcher, some peers rather than others, and *self* (when the children talk to themselves in instances of private speech). Qualitative analysis suggested that the extent to which the focal children used Chinese

seems to relate to the social roles that each of them played in the classroom. A leadership role that involved Filip's identification with the teacher appeared to promote his use of Chinese, while Betty's resistance to the teacher's authority tended to promote her use of English. As peer leaders, either emulating or resisting the teacher, Filip and Betty appeared to exert strong impact on language behavior of other children who played the role of follower, such as Elin. Such followers tended to make moment-to-moment language accommodation to the language choices of the peer leaders in oral interaction.

Research Question 2 – Effect of Tasks and Activities

Research Question 2. In a second-grade one-way early total Chinese immersion classroom, how much English L1 and Chinese L2 are used by focal students while carrying out academic compared to non-academic tasks and activities?

The second research question focuses on whether tasks and activities affect the three child participants' language choice of English or Chinese during academic and non-academic time. Rbrul results in Tables 2-7 show which tasks and activities are most influential, statistically speaking, in influencing each of the three child participants' choice between Chinese and English. In the following section, each child participant will be analyzed in turn starting with Filip. For each focal child, I will first report the quantitative results of Rbrul, and then I will report qualitative observations and transcript examples to shed light on the Rbrul results.

Filip

Filip uses Chinese almost all the time; the overall proportion of his Chinese use is 0.971 during academic time (Table 4) and 0.907 during non-academic time (Table 5). In other words, Filip speaks Chinese 97.1 % of time during academic time and 90.7% of the

time during non-academic time. Rbrul results in Table 4 show that during academic time, none of the three task dimensions changes Filip's Chinese language use much. During non-academic time, Rbrul results in Table 5 show some differential impact of the activities of recess, transitions, and snack time on Filip's language choice; Rbrul results show that, using a significance level of 0.05, snack time (log-odds = -0.965; $p < 0.0001$) and transitions (log-odds = -1.108; $p < 0.0001$) significantly promote Filip's use of English compared with recess, the reference level. Filip speaks a little bit of English during snack time and transitions, contexts when observations show he also seems to step out of his role of mini teacher or leader, joining other children's conversations and play activities already underway in English (please see Examples 37 and 38), as well as when he has conversations with other children in the hall way, which is usually not in earshot of the teacher or the researcher (please see Example 39).

Betty

The overall proportion of Betty's Chinese use is 0.682 during academic time (Table 2) and 0.4 during non-academic time (Table 3). In lay terms, Betty uses Chinese roughly 68% of the time during academic time and 40% of the time during non-academic time.

Academic Time

Table 2 shows that, using a significance level of 0.05, the three task dimensions – task activity ($p < 0.0001$), task content ($p < 0.0001$), and on/off task ($p < 0.0001$) all play a significant role influencing Betty's choice between Chinese and English during academic time.

Task Activity

Rbrul results in Table 2 show that during academic time, compared with teacher-fronted instruction (the reference level), interactive activities (log-odds = - 0.896; $p < 0.0001$) and producing written assignments (log-odds = -1.069; $p < 0.0001$) strongly promote Betty's use of English at the significance level greater than 0.05. In other words, Betty uses Chinese less in interactive activities and producing written assignments, and more in teacher-fronted instruction. Classroom observations show that, while in teacher-fronted instruction, Betty's learning and language use are closely monitored by the teacher, such teacher-monitoring occurs less in Betty's interactive activities and producing written assignments. During interactive activities, Betty appears to put more distance between herself and the teacher when the opportunity arises, and when she is producing her written assignments in her small group, her desk is located far away from the teacher's desk. The physical distance between Betty and the teacher could be one possible reason why Betty tends to speak more English when she is writing her assignments and when she is doing interactive activities, because when her conversations are not in earshot of the teacher, she has a tendency to speak in English.

Qualitative analysis further suggests that the level of scaffolding supporting Betty's use of Chinese and the cognitive load of an academic activity, seem to impact Betty's language use, and could be other reasons why Betty uses more English in producing written assignments and in interactive activities than in teacher-fronted instruction. When Betty is writing her assignments, she tends to ask more questions than during teacher-fronted instruction. In those instances, Betty mostly uses English to ask her group members Andrea and John for help. In fact, Betty produces many more tokens

(1590) in producing written assignments than Elin (657) and Filip (941) do, partly because she seems to have more questions to ask than the other two children. Surprisingly, a lot of the time, Betty's questions could not be answered by John and Andrea, because they didn't have a solution either. Example 70 below shows how, when Betty is seeking help and talking about her problems with John and Andrea, she tends to speak English.

Example 70. 3/5/2020. Content: Math. Context: Producing written assignments.

1. Betty	what do you do here?
2. John	[we don't know.
3. Andrea	[we don't know.
4. Betty	ok.
5. Andrea	no one cares.
6. John	I don't care that (…).
7. Betty	yi pian:: ^ 一片::^ *a piece of::^*
8. Andrea	ok! I am going to twenty! no one's gonna (…) me! ((flipping pages))
9. Betty	shi wu. (1) ((referring to page 15 where she is on)) 十 五.(1) *fifteen. (1)*
10.	but did she say to circle it?
11. Andrea	[I don't know.
12. John	[maybe, I don't know. maybe.

As we can see from Example 70, Betty seeks help from Andrea and John, speaking almost entirely in English; John and Andrea seem to be equally confused and

clearly don't have an answer to Betty's questions. In line 7 when Betty is trying to say something in Chinese and seems to get stuck (because the sound of "pian::" is lengthened and followed by a glottal stop, indicating that the utterance is unfinished), she does not receive any type of scaffolding from either John or Andrea to help her complete her utterance in Chinese. In line 9, Betty starts with Chinese saying that she is on page fifteen, but then in line 10 she switches right back to English to ask another question she has – whether they need to circle the answer. Lines 11 and 12 show that neither John and Andrea know whether they should. This is a typical example of Betty's conversations with her group members in writing activities. Most of the time, she does not get much help from peers in her group when she gets stuck in trying to solve a math problem or in trying to say something in Chinese. Counter-intuitively, whereas Betty seems to have a lot of questions on her assignments, she rarely asks the teacher or the researcher for help (unlike Elin, as we will see later). The fact that Betty has to use Chinese with the adults (see sections of interlocutor effect) seems to mean that she would rather not talk to them when she has questions about her assignments.

Classroom observations show that the teacher frequently has the children do a variety of interactive activities before teacher-fronted instruction as a way to prime the children for the content knowledge they will be learning as a whole class later. Thus, many of these activities are likely to be cognitively challenging for the children because they are basically getting hands-on experience of new concepts that the teacher has not talked about yet. Data suggest that when an interactive activity is cognitively challenging for Betty, she tends to use more English than Chinese. In Example 71, Betty is working together with Elin in the corner of the classroom on an interactive activity asking the

children to piece the geometric shapes in their math workbook with geometric pattern blocks. While Betty and Elin are working together on this activity, they get stuck on quite a few problems, suggesting greater cognitive load. Even so, both girls appear to be engaged in the task, actively thinking and trying things out. When they are trying to figure out these problems, their conversations are primarily in English, as Example 71 shows.

Example 71. 3/4/2020. Content: Math. Context: Interactive activity; piece shapes with geometric pattern blocks.

1. Elin	found it. (2) found it! (3)
2. Betty	okay! (1)
3. Elin	oh you're using my pencil. oh my gosh!
4. Betty	they look the same. (3)
5. Elin	so::(0.5) it's (1) this one ↑ =
6. Betty	= wait, I don't have an eraser. can I have an eraser?
7. Elin	[oh-
8. Betty	[that's what- =
9. @T	[wo ting dao na ge shei, chen min ta man zai na er zhong wen jiang de ke hao le. [我 听 到 那 个 谁, 陈 旻 他 们 在 那 儿 中 文 讲 的 可 好 了. [*I hear Deon and his group speaking very good Chinese over there.*
10. Betty	hao, wo men shuo- (0.5) zhe ge ↑? 好, 我 们 说- (0.5) 这 个 ↑? *ok, let's speak- (0.5) this ↑?*
11. Elin	uh-huh. (5)

12. Betty **no! but** teng lao shi shuo {wo men-} wo men yao zuo zhe ge. (3)
no! but 滕 老 师 说 {我 们-} 我 们 要 做 这 个.(3)
no! but Ms. Teng said {we-} we should do this. (3)

13. ah:: I see what you are doing ↑ . (1) no, then you would need- (1)

14. so we need to make it bigger. aw:: ((sighing))

15. this one's really hard.

As we can see from this example, in lines 1 through 8, Betty and Elin's conversation stays in English. In lines 10 and 12, although Betty temporarily switches from English to Chinese upon the teacher's indirect request in line 9, she switches right back to English in line 13 and remains in English until the end of the conversation, where she appears to be fully concentrated on processing the problem by commenting on what Elin is doing, thinking aloud to herself, giving suggestions, and commenting on the problem.

Classroom observations also suggest that certain individual activities seem to have a strong impact on Betty's use of one language or the other. One example is the "balancing game" that the teacher uses to teach the scientific concept of "balancing". This game is different from other interactive activities in influencing children's language use, because whereas other interactive activities tend to be intellectual in that children are using language to negotiate meaning and to share information with each other, the "balancing game" activity tends to be purely physical and does not require any talk from children at all. During the game, the teacher separates the children into two teams. Each child puts a paper cup on top of his/her head and walks from one side of the classroom to the other. If the paper cup falls down to the ground, the player has to go back to the starting point and try again. The team which gets finished first wins the competition. This game seems to be like other competitive games that children play on the playground

which involves a lot of physical agility and which also are carried out with side commentary in English. A lot of the time, these side commentary in English are almost like self-talk, which includes a lot of exclamations, such as “ouch!” “god!” “come on!” “what?!”, “go go!” etc. During the game, Betty is observed to speak English exclusively to excitedly encourage other children and to make comments on what makes a good player, as we can see in Examples 72 and 73.

Example 72. 3/11/2020. Content: Science. Context: Balancing game.

1. Deon you stay there!
2. Liz I have a curve on my head.
3. Betty go go, go!

Example 73. 3/11/2020. Content: Science. Context: Balancing game.

1. Evelyn I have a curve on my head,
2. Betty probably let it fall, 'cause I have a curve on my head.
3. Betty I know.
4. Brian (…) with it
5. Evelyn my brother doesn't have a curve but
6. Betty boys do it so good 'cause they - =
7. Ss = yay!!!

Task Content

Rbrul results in Table 2 show that using a significance level of 0.05, there’s no significant difference between math (log-odds = - 0.118; p = 0.278) and Chinese language arts (the reference level) in terms of the amount of influence they exert on Betty’s use of Chinese. At present, time and space do not allow for a thorough in-depth analysis of why Chinese language arts and math promote Betty’s use of Chinese to a very similar degree. But the age-appropriate pedagogies the teacher uses and the on-time scaffolding she provides to the children in both math activities and Chinese language arts activities may explain why math does not differ significantly from Chinese language arts

in promoting Betty's (and Elin's, see Table 6) use of Chinese. While the teacher always uses a variety of teaching techniques and offers a great deal of on-time scaffolding in Chinese language arts, she seems to do this at least as much and possibly even more in math activities, to make the content as accessible to the children as possible and to create many opportunities for the children to use Chinese in a meaningful way. In the following paragraphs, I present transcript examples of Betty's interactions during math and Chinese language activities to further illustrate these classroom observations. (Similar examples of Elin will be presented in the next section where I talk about the effect of task content on Elin's language use.)

During Chinese language arts, the teacher is observed to develop the children's reading and listening comprehension skills and at the same time expand their Chinese vocabulary and structures. When the whole class are reading stories together, the teacher offers comprehensible input to the children in different modalities, including listening to the audio, watching animation and looking at pictures. When the teacher reads a story to the whole class, she paraphrases the story using words and phrases that are easily accessible to the children. The teacher also asks all kinds of questions to check the children's comprehension and invites the children to share their understanding of the stories. When the teacher teaches new words and structures, she always makes these forms as comprehensible to the children as possible by connecting them to the children's real lives, and gives timely scaffolding when they get stuck in expressing meaning in the process of learning to use these new forms. For example, when the whole class is learning the structure "又…又 …" (both + adj. and + adj.), rather than giving a complicated dictionary definition of the structure, the teacher asks the children to

describe a classmate, using Filip as the model to be described. The children, including Betty, actively participate in the discussion, contributing all kinds of Chinese words they can think of to describe Filip with the teacher's help. As we can see in Example 74 below, during this activity when Betty gets stuck in line 2, the teacher co-constructs Betty's utterance by offering the word "gao" (*tall*) in line 3, and then in line 4, Betty repeats the co-constructed utterance.

Example 74. 3/12/2020. Content: Chinese language arts. Context: Teacher-fronted instruction.

1. T	xian xiang liang ge te dian. 先 想 两 个 特 点. *first think about two characteristics.*
2. Betty	ta hen:: 他 很:: *he's very:::*
3. T	ta hen gao dui ba? 他 很 高 对 吧? *he's very tall right?*
4. Betty	ta hen gao. 他 很 高. *he's very tall.*

After having the children freely share the Chinese words they can think of, in Example 75, the teacher then invites Frank to pick two words among the pool of words that they have just shared to describe Filip, using the target structure "又…又 …" (both + adj. and + adj.). As we can see in Example 75, in line 4, during this exchange, Betty self-initiates a turn to help co-construct the sentence by contributing the second half of the structure "you shuai" (*and handsome*).

Example 75. 3/12/2020. Content: Chinese language arts. Context: Teacher-fronted instruction.

1. T	fu ke, ni bang wo shuo. fei lin you:: 福克，你 帮 我 说. 费 林 又:: *Frank, you help me say it. Filip is both::*
2. Frank	you gao 又 高 *both tall*
3. T	you gao:: ((writing "又高" on white board)) 又 高:: *both tall::*
4. Betty	you shuai! 又 帅! *and handsome!*
5. Frank	you shuai. 又 帅. *and handsome.*
6. T	you shuai, you gao you shuai. ((writing "又帅" on white board)) 又 帅, 又 高 又 帅. *and handsome, both tall and handsome.*

During math lessons, the teacher not only provides scaffolding on the Chinese language when necessary, she also uses a variety of pedagogical techniques to make the math content delivered in the L2 as accessible to the children as possible. The teacher designs a variety of student-centered interactive activities to prime the children for the math content they will be learning and to create opportunities for the children to use Chinese in meaning-based contexts. These activities are supported by all kinds of pedagogical tools and materials, such as geometric pattern blocks and fraction cards. During teacher-fronted instruction, the teacher draws all kinds of colorful pictures to make the math concepts understandable for the children and also guides and encourages

the children to draw pictures themselves to facilitate understanding when they are doing the math assignments on their own. As we can see in Example 76, when Betty is helping Zoey with her math assignments, she says (in English) that the strategy of picture drawing is very helpful and makes the math problems easier.

Example 76. 3/11/2020. Context: Recess.

1. Betty	short-sleeve. (2) ((drawing pictures on Zoey's notebook))
2.	ok, that's not a short-sleeve. ok.
3. Stella	{I didn't-}I didn't do that.
4. Betty	that's why I did it (anyway). (0.5) and it's easier I think.

During teacher-fronted instruction of math using the Chinese language, even though it is the teacher who takes the lead, the lessons are fairly student centered, because the teacher asks all kinds of questions to guide the children's thinking and to check their comprehension, giving timely scaffolding as needed. The teacher also frequently invites the children to come to the front to draw pictures on the white board, asks them to talk in Chinese about their ideas and solutions to a problem, and sometimes has the children explain the rationale behind their solutions. The math lessons are always carefully scaffolded through easy-to-hard, as Examples 77 and 78 show. In these two examples, the whole class is talking about the concept of equivalent fractions and how to make two fractions equal to each other.

In Example 77, the teacher first asks the children to change 1/2 to 2/4 and then to 3/6 with the help of pictures. In this example, carried out entirely in Chinese, Betty seems to follow the teacher's instruction very well. She listens attentively and actively answers the teacher's questions in Chinese. Although she gets her answer wrong in line 11, in line 13 she quickly makes a correction based on Filip's contribution in line 12.

Example 77. 3/9/2020. Content: Math. Context: Teacher-fronted instruction.

1. T — er fen zhi yi shi zhe me duo dui bu dui?
二 分 之 一 是 这 么 多 对 不 对?
a half is this much right?
((teacher drawing  on white board, and writing 1/2 on top of this picture))

2. Betty — ° dui. °
° 对. °
° *right.* °

3. T — ta deng yu si fen zhi zhi? (1) ((teacher drawing  on white board))
它 等 于四 分 之 几? (1)
it equals to what fourths? (1)

4. S1 — si fen [zhi yi!
四分 [之 一!
one [fourth!

5. Betty — [si fen zhi :: (2) ° er °
[四 分 之:: (2) ° 二 °
[° *two* ° *(2) fourths*

6. T — a ↑ ?
啊 ↑ ?
what ↑ ?

7. Betty — [si fen zhi er!
[四分 之 二!
[*two fourths!*

8. Ss — [si fen zhi er!
[四分 之 二!
[*two fourths!*

9. T — dui ma, si fen li mian de liang fen gen ta shi yi yang da de.
对 嘛, 四份 里 面 的 两 份 跟 它 是 一 样 大 的.
right, two out of the four parts are in the same size as this one.
((teacher applying color to the left half of  , the picture now looks like  ; teacher writing 2/4 on top of ))

10. — wo zai kao mi ge wen ti. (6) ((teacher drawing  on white board))
我 再 考 你 个 问 题.(6)

let me test you with another question. (6)

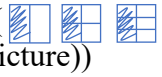
11. Betty liu fen zhi er!
六 分 之 二!
two sixths!

12. Filip liu fen zhi san!
六 分 之 三!
three sixths!

13. Betty san!
三!
three!

Based on the three examples the teacher gives in Example 77 (i.e., 1/2, 2/4, and 3/6), the teacher goes one step further in her teaching in Example 78; in line 1 she asks the children if they find any patterns and regularities. In lines 4 and 6, Betty seems to be part way getting the right answer. At the same time in lines 5 and 7, Nikki contributes the right answer in Chinese, saying that all the three factions means "half". Betty hears Nikki's contribution and in line 8, she first registers her approval for Nikki's answer by saying "dui" (*right*) in Chinese and then picks it up by starting to repeat it. Her utterance is interrupted but also gets co-constructed by Elin and Filip in lines 9 and 11. At the end of the exchange, Betty seems to know the right answer to the teacher's question, and at the same time, she also seems to know how to express this meaning specifically in Chinese.

Example 78. 3/9/2020. Content: Math. Context: Teacher-fronted instruction.

1. T liu fen zhi san, ni fa xian yi ge shen me gui lv?
六 分 之 三, 你 发 现 一个 什 么 规 律?
three sixths, what pattern do you find?
(( on white board, with 1/2, 2/4, and 3/6 on topic of each picture))

2. Filip yi er san ((referring the numerators of the three factions))

一二三
one two three

3. T hu che.
胡 扯.
lies.

4. Betty yi er [san ((referring the numerators of the three factions))
一二[三
one two [three

5. Nikki [ta men dou shi [yi ban.
[他 们 都 是 [一 半.
[*they are all [half.*

6. Betty [er si liu
[二四六
[*two four six*
((referring the denominator of the three factions))

7. Nikki ta men dou shi yi ban.
他 们 都 是 一 半.
they are all half.

8. Betty dui, [dou shi- =
对, [都 是- =
tight,[all are- =

9. Elin [ta men dou shi yi [ban
[他 们 都 是 一 [半!
[*they are all [half!*

10. Betty [ban
[半
[*half*

11. Filip = dou shi yi ban!
= 都 是 一 半!
= *all are half!*

As we can see from Examples 77 and 78, the teacher carefully scaffolds her math lessons, moving from easy to complicated, and the children, including Betty, seem to

follow the teacher's instruction in Chinese very well by actively participating in the discussion and answering the teacher's questions in Chinese. As we have seen from these two examples, a lot of co-constructions occur among the children. They build on each other's contributions in terms of both the content knowledge that they are in the process of learning and the linguistic forms in Chinese that are used to express the meaning.

Rbrul data in Table 2 also shows that compared with Chinese language arts (the reference level), health strongly promotes Betty's use of Chinese (log-odds = 2.547; $p < 0.0001$) whereas science strongly promotes her use of English (log-odds = - 2.206; $p < 0.0001$), using a significance level of 0.05. Observations suggest that these differences in Betty's Chinese use seem to relate to the level of teacher monitoring and scaffolding during instruction and the learning goals in these two subject areas. For example, during the 45-minute health lesson, the health teacher carefully monitors the children's behavior and language use. In that lesson, teacher-fronted instruction is coupled with interactive activities where the children are asked to do small scale discussions in pairs. While the children are talking to their partners who sit next to them on the carpet, the health teacher walks very closely to the groups, listens carefully and frequently participates in their conversations. Example 79 shows Betty's language use during health. As we can see from this example, Betty speaks almost entirely in Chinese in her discussion with Zoey.

Example 79. 3/10/2020. Content: Health. Context: Interactive activities.

1. Betty	{ni- **no** zhe ge shi-} zhong yi, {zhe ge shui eh} (0.5) {你- no 这 个 水-} 中 逸, {这 个 水 eh} (0.5) *{you- no the water-} Zoey, {the water eh} (0.5)*
2.	ni zai eh you yong de shi hou (1) 你 在 eh 游 泳 的 时 候 (1) *when eh you are swimming (1)*

3. zhe ge tai **deep** le ↑ (0.5) ni bu kan dao **and** ni eh- (2)
这 个 太 deep 了 ↑ (0.5) 你不 看 到 and 你 eh- (2)
this is too deep ↑ (0.5) you don't see and you eh- (2)

4. Zoey **sink**. ni eh **drown**.
sink. 你 eh drown.
sink. you eh drown.

Why does this science lesson promote English? My observations of the 45-minute introductory science lesson suggest that its primary pedagogical goal is not to hone the children's language skills, but to help them develop a good understanding of key scientific concepts. The science lesson that I observed is the very first introduction to a new unit on balance, where the children watch a video of acrobatics to see what balance is, listen to the teacher lecturing about the concept and sometimes give one-word answers to the teacher's questions in Chinese, as Example 80 below shows, and do physical activities to feel and experience a balanced status.

Example 80. 3/10/2020. Content: Science. Context: Teacher-fronted instruction; watching a video of acrobatics.

1. T ta shi bu shi ping heng le?
他是 不是 平 衡 了？
is he balanced?

ni kan ta zhan zai zhe ge guan zi shang mian, shi bu shi?
你看 他 站 在 这 个 管 子 上 面，是 不 是？
you see that he is standing on the pipe, right?

2. Betty shi!
是！
right!

For their science writing assignments, the children are asked to copy the definition of balancing in Chinese on their notebook and to evaluate whether the objects in three pictures are in a balanced status or not. In other words, for the most part in this particular

introductory science lesson, the children are basically listening, watching and experiencing, but are not asked to speak; balance is treated as something to feel and experience but not something to talk about in this lesson. The observation that there is very little language production required from the children in the science lesson is very different from Chinese language arts lessons and math lessons where the children are asked to say out loud what they think about a story or to describe their reasoning in a variety of math problems. As we have seen from Examples 72 and 73 in the previous section, when the children are playing the "balancing game" in the science lesson, they tend to speak English, mostly in the form of private speech or side commentary. It is worth noting that I couldn't gather enough examples to generalize findings to all science lessons. It might be the case that in other science lessons that are not introductory lessons to a new unit, there may be more opportunities for productive language use in Chinese among children.

On/Off Task

Rbrul results in Table 2 show that, using a significance level of 0.05, on-task situations (log-odds = 1.063; $p < 0.0001$) promote Betty's use of Chinese more than off-task situations (the reference level) do during academic time. When Betty is on task, the conversation topics that she has with her peers are academically related and she tends to speak a lot of Chinese. In Example 81, Betty is asking Nikki in Chinese whether she gets all her answers right.

Example 81. 3/10/2020. Content: Math. Content: Producing written assignments.

1. Betty zhe ge shi dui ma? (10)
这 个 是 对 吗? (10)
is this right? (10)

2. Nikki bu dui.
不 对.
not right.

3. Betty bu dui ↑ ? (2) na ge shi bu dui ↑ ? (5) zhe ge shi bu dui ↑ ?
不 对 ↑ ? (2) 哪 个是 不 对 ↑ ? (5) 这 个 是 不 对 ↑ ?
not right ↑ ? (2) which one is not right ↑ ?(5) this one is not right ↑ ?

However, when Betty is off task, the topics of her conversations with other children tend to be socially related, and Betty speaks entirely in English, as we can see in Example 82. In this example, Betty's small group chit-chat about Wayne's birthday party.

Example 82. 3/9/2020. Content: Chinese language arts. Content: Producing written assignments.

1. Andrea Wayne's birthday party was epic. you could go on-
2. John I didn't go.
3. Betty I did.
4. John I [(don't excite).
5. Andrea [tell him about the birthday party.
6. Betty ok, the birthday party was weird.
7. Andrea at the birthday party we watched Sonic↑.
8. John yeah I already know the whole movie.

Non-academic Time

Rbrul data in Table 3 show that during non-academic time, the particular activities Betty engages in do not exert a significant impact on Betty's language choice. The impact of these activities falls below the significance level of 0.05: transitions, recess and snack time. The only factor that exerts a strong influence on Betty's language use during non-academic time is the interlocutor (See detailed discussion of interlocutor effects and Betty's social roles in the previous section, pp. 89-125).

Elin

Elin's language use related to context and task is very similar to Betty's. The overall proportion of Elin's Chinese use is 0.601 during academic time (Table 6) and 0.415 during non-academic time (Table 7).

Academic Time

Rbrul data in Table 6 show that, using a significance level of 0.05, the three task dimensions – task activity ($p = 0.0116$), task content ($p = 0.00513$) and on/off task ($p < 0.0001$) all play a significant role in conditioning Elin's language use during academic time. This pattern is similar in most ways to Betty's reported above.

Task Activity

Rbrul results in Table 6 show that using a significance level of 0.05, only interactive activities (log-odds = - 0.804; $p = 0.0001$) are significantly different from teacher-fronted instruction (the reference level) in that they promote Elin's use of English. There is no significant difference between teacher-fronted instruction and producing written assignments (log-odds = - 0.337; $p = 0.1171$); both promote Elin's Chinese use to a very similar degree. Unlike Betty, Elin uses more English in interactive activities, but switches to Chinese both in teacher-fronted instruction and writing activities.

An interesting question to ask is, why does producing written assignments promote Elin's use of Chinese while those same written assignments promoted Betty's use of English? Qualitative analysis suggests a few possible explanations. First of all, whereas Betty locates her group far away from the teacher's desk, Elin's group is located closer to the teacher's desk than any other group in the classroom. The place where Elin

is seated allows her to easily observe the teacher and for the teacher to easily monitor her behavior and language use when she is doing her assignments. Since Elin is very socially aware, she must clearly know that her behavior is under the teacher's supervision and if she speaks English, the teacher can hear her. That could be one possible reason why Elin's language behavior in producing written assignments does not change significantly compared with that in teacher-fronted instruction, where her learning and language use is strictly monitored by the teacher.

Second, Elin demonstrates very different behavioral patterns than Betty when she is writing her assignments. Unlike Betty, Elin does not seem to have as many questions about her assignments as Betty does; this observation also seems to get reflected by the many fewer tokens that Elin produces (657) in producing written assignments than Betty does (1590). Additionally, different from Betty who mostly seeks help from her group members when she encounters any problems even though she doesn't usually get an answer from them, Elin seems to know clearly that adults and only some peers can give her the best support when she has questions about her assignments. Data suggest that Elin frequently asks the adults (i.e. the teacher and the researcher) and a couple of other academically competitive children for help, and does so in Chinese, and mostly she receives good academic scaffolding from these people during her exchanges with them. In Example 83, when Elin is writing her math assignments, she asks Evelyn in Chinese how to solve the math problem in Figure 5 below. Please see the text boxes for its English translation.

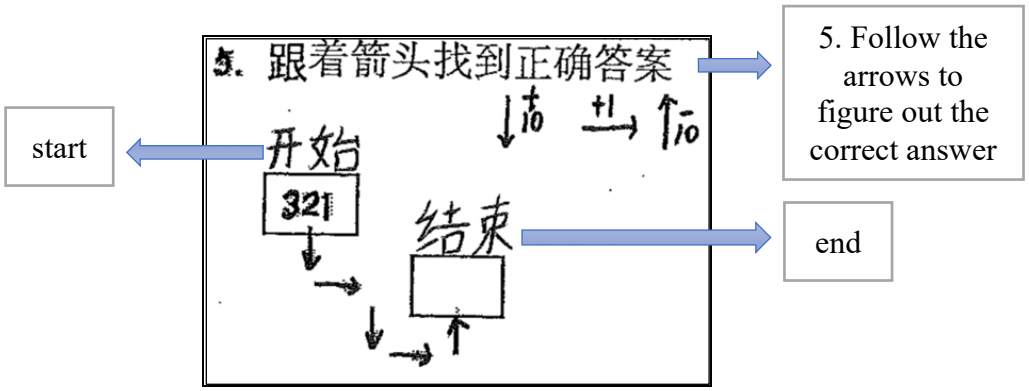


Figure 5
The math problem Elin is working on in Example 83

Example 83. 3/4/2020. Content: Math. Context: Producing written assignment.

1. Elin — ao lin (2) zhe ge shi shen me?
奥 琳 (2) 这 个 是 什 么?
Evelyn (2) what is this?

2. Evelyn — (…), **like** zhe ge shi jia shi, jia yi jia shi, jia yi jian shi.
(…) , like 这 个 是 加 十, 加 一加 十, 加 一 减 十.
(...), like this is plus ten, plus one plus ten, plus one minus ten.

3. — zhe ge jia shi shi shen me?
这 个加 十 是 什 么?
what is this plus ten?

4. Elin — eh san bai san shi yi.
eh 三 百 三 十 一.
eh three hundred and thirty-one.

5. Evelyn — ni yao jia yi.
你 要 加 一.
you need to plus one.

6. Elin — ° san bai san shi er, san bai si shi, san bai si shi::san, sai bai san shi::- san shi::- ° (6)
° 三 百 三 十 二, 三 百 四十, 三 百 四 十:: 三, 三 百 三 十::- 三 十::- ° (6)
°*three hundred and thirty-two, three hundred and forty, three hundred and thirty:: three, three hundred and thirty::- thirty::- °(6)*

7. ao lin, ao lin, zhe ge shi shen me? (2) zhe ge **answer** shi shen me?
奥 琳, 奥 琳, 这 个 是 什 么? (2) 这 个 answer 是 什 么?
Evelyn, Evelyn, what is this? (2) what is this answer?

8. Evelyn san bai san shi san.
三 百 三 十 三.
three hundred and thirty three.

As we can see from Example 83, Elin's conversation with Evelyn almost exclusively stays in Chinese. After Elin poses her question in line 1 in Chinese, Evelyn explains to Elin in Chinese what she should do in lines 2, 3 and 5. In line 6, Elin follows Evelyn's instruction and starts to work on solving the problem by herself, and her private speech stays in Chinese. It seems that Elin gets stuck in calculating the final answer to this question, so in line 7, she asks Evelyn in Chinese what the final answer is. In line 8, Evelyn replies in Chinese.

Based on Evelyn's explanation and help in Example 83, Elin seems to clearly know how to solve this problem, because later when the whole class talks about the problem and Filip gives the wrong answer, in line 4 Elin blurts out with English "what?!" with surprise as we can see in Example 84, and then when the teacher goes through this question with the whole class, Elin follows the teacher's instruction very well, confidently giving the right answer at each step, as Example 85 shows below.

Example 84. 3/4/2020. Content: Math. Context: Teacher-fronted instruction.

1. T dou shi san bai san shi san? bu shi?
都 是 三 百 三 十 三? 不 是?
you all got three hundred and thirty two right? no?

2. Filip {wo- wo shi^-}wo jue de shi {san^-} san bai (0.5) si shi wu,
{我- 我 是^-}我 觉 得 是 {三^-} 三 百 (0.5) 四十 五,
{I- I got^-} I think it's {three^-} three hundred (0.5) and forty-five,

3. o san bai si shi wu.
哦三 百 四 十 五.
oh three hundred and forty-five.

4. Elin what?!

Example 85. 3/4/2020. Content: Math. Context: Teacher-fronted instruction.

1. T zhe shi san bai san shi er. ran hou wang xia.
这 是 三 百 三 十 二.然 后 往 下.
this is three hundred and thirty-two. then downwards.

2. Elin [san bai si shi:: er
[三 百 四 十:: 二
[*three hundred and forty:: two*

3. Filip [°san bai san shi-°
[°三 百 三 十-°
[°*three hundred and thirty-*°

4. Ss [san bai si shi er
[三 百 四十 二
[*three hundred and forty-two*

5. T hao, zhe bian!
好， 这 边！
ok, here!

6. Filip [°san bai-°
[°三百-°
[°three hundred-°

7. T [san bai:: si shi san
[三 百:: 四十 三
[*three hundred:: and forty-three*

8. Elin [san bai:: si shi san
[三 百:: 四十 三
[*three hundred:: and forty-three*

9. Ss [san bai si shi san
[三 百 四十 三
[*three hundred and forty-three*

10. T wang shang
往 上
upwards

11. Elin [san bai san shi san
[三 百 三 十 三
[*three hundred and thirty-three*

12. Ss [san bai san shi san
[三 百 三 十 三
[*three hundred and thirty-three*

13.Filip oh! ((suddenly everything seems to click for Filip))

For both Betty and Elin, teacher-fronted instruction strongly promotes Chinese, but interactive activities strongly promote English. Indeed, data suggest that Elin does most of her interactive activities with Betty – the leader of the girl group – sometimes upon the teacher's request and sometimes based on negotiation in the friendship cluster. When Elin works together with Betty, the two girls are observed to mostly work near/in the corner of the classroom, which is far away from the teacher's desk and which is also far away from the place where they have teacher-fronted instruction. The physical distance that the two girls create between themselves and the teacher seems to offer them a space where they can speak English, a language that the friendship clique also tend to speak when they are off on their own. Another possible reason why Elin tends to speak English during interactive activities could be that sometimes, as explained above on p.197, the cognitive load of these activities is high and this promotes use of English; in those instances, Elin tends to speak in English to regulate her thinking. Example 86 below seems to offer evidence to support both possibilities.

In Example 86, Elin and Betty are working together on a geometric pattern block activity, where they use the pattern blocks to piece the shapes on their math workbook. In

lines 1 and 2 Elin speaks almost entirely in Chinese to talk to the teacher. However, in lines 5 and 7, she switches back to English to talk to Betty. Elin's language shift appears to be because since she is talking to Betty – the leader of the girl group which meets in a place away from the teacher; here she tends to use English, the language that is spoken by the friendship clique. Her language shift could also be that since this is a cognitively challenging activity, she needs to rely on English to regulate her thinking while she is solving this problem, as in lines 5 and 7.

Example 86. 3/4/2020. Content: Math. Context: Interactive activity; piecing shapes with geometric pattern blocks.

1. Elin	teng lao shi,{wo men yao-}wo men **have to** yong{zhe ge-}zhe ge hong se de ma? 滕 老 师,{我 们 要-} 我 们 have to 用 {这 个-} 这 个 红 色 的 吗? *Ms. Teng. {should we-} do we have to use {this-} this red one?*
2.	wo men ke yi yong zhe ge lv se de **small triangle** ma? 我 们 可以 用 这 个 绿色的 small triangle 吗? *can we use the small green triangle?* ((showing the teacher a green triangle))
3. T	sui bian ni, ni zhi yao zhao zhe ta na ge yao qiu zuo jiu xing. 随 便 你,你 只 要 照 着 它那 个 要 求 做 就 行. *it's up to you, as long as you follow its instructions.*
4. Elin	wo men ke yi yong **anyone**. ((on her way back to the corner)) 我 们 可以 用 anyone. *we could use anyone.*
5.	I know how to make it. (2) ((in the corner resuming her work with Betty))
6. Betty	wait, I know what we could do! [look! ((Betty trying with the pattern blocks to piece the shapes on the workbook))
7. Elin	[so you go this ↑ (1) and then this. (7) ((Elin piecing pattern blocks))

Classroom observations also suggest that, just as it did with Betty, the "balancing game" that the teacher uses to teach science also strongly promotes Elin's use of English. During this activity, Elin is observed to speak English almost the whole time. For example, when her paper cup falls down to the ground so many times that she seems to get really annoyed, Elin speaks to herself in English, saying "god, come on!" in a low voice. After Elin's team loses the competition, Elin seems to be irritated and starts to attack the other team, speaking entirely in English, as Example 87 shows below.

Example 87. 3/11/2020. Content: Science. Context: Interactive activity; the balancing game.

1. Elin guys! you've already won! why're you guys still doing it?! =
2. John = you keep playing if you like!

Task Content

As with Betty, Rbrul results in Table 6 show that using a significance level of 0.05, there is no significant difference between math (log-odds = - 0.201; p = 0.18526) and Chinese language arts (the reference level) in the amount of influence they exert on Elin's use of Chinese and English. No data on health were gathered for Elin because she was sick that day and stayed home. The content of science (log-odds = - 1.038; p = 0.00317) strongly promotes Elin's use of English, just as it did with Betty.

As with Betty above, the teacher's employment of age-appropriate pedagogy and use of a good deal of scaffolding in both subject matters, especially in math, seem to promote Elin's use of Chinese. For a more detailed description of the pedagogical methodology and techniques that the teacher uses in Chinese language arts and math, please see Betty' section. Here, I will present transcript examples in both content areas to sketch out the dynamics in those interactions where Elin's use of Chinese is promoted.

In Example 88, during Chinese language arts, the whole class is talking about the children's story *The Happy Prince* written by Oscar Wilde. When the teacher tells the story, she shows the children the illustrations in the book and also invites them to co-construct the story together with her.

Example 88. 3/5/2020. Content: Chinese language arts. Context: Teacher-fronted instruction.

1. T	zui hou fa sheng le shen me? 最 后 发 生 了 什 么? *what happened at the end?*	
2. Elin	zhe ge xiao niao si le. 这 个 小 鸟 死了. *the bird died.*	
3. T	ran hou ta zi ji ne? 然 后 他自己呢? *then how about himself?*	
4. Elin	ta (0.5) mei- ta mei you jin se de yi fu, [ta mei you- 他(0.5) 没- 他 没 有 金 色 的衣服, [他 没 有- *he (0.5) doesn't- he doesn't have golden clothes, [he doesn't have-*	
5. T		[ye mei you lan se de yan jing [也 没 有 蓝 色 的 眼 睛 [*also doesn't have blue eyes*
6. Elin	ye mei you zhe ge hong se de- (0.5) 也 没 有 这 个 红 色 的- (0.5) *also doesn't have the red- (0.5)*	
7. T	bao shi. 宝 石. *gemstone.*	
8. Elin	bao (1) jian ↑? 宝 (1) 剑 ↑? *swor (1) d ↑?*	
9. T	bao jian, ni shuo de hen hao!	

宝 剑，你说 的 很 好!
sword, you say it very well!

In Example 88, in line 1, the teacher asks the children what happened at the end of the story, showing the pictures in the book to help them form their ideas. In line 2, Elin self-initiates a turn by answering the teacher's question in Chinese, saying "*the bird died*". In line 3, the teacher prompts Elin to say more about the story ending, asking her a different question about the prince himself. In line 4, in Chinese, Elin starts to describe what happened to the prince based on the pictures in the book, but her 0.5 second pause and the false start at the beginning of this turn seem to be an indirect request for help, and in line 5, the teacher co-constructs the meaning together with Elin in Chinese, giving her a little bit of scaffolding. In line 6, Elin does not repeat the teacher's contribution but she borrows the adverb "ye" (*also*) from the teacher's expression, which is used to show that something else also happens and to maintain cohesiveness with the previous sentence; she self-corrects her previous expression at the end of line 4 from "ta mei you-" (*he doesn't have-*) to "ye mei you" (*also doesn't* have). Elin's Chinese utterance in line 6 is incomplete, but in line 7 it gets co-constructed by the teacher, offering her a word that she might be trying to say. In line 8, Elin does not use the teacher's word *gemstone*, rather she attempts to say a different word *sword* in Chinese. In line 9, the teacher first repeats the word that Elin contributes to affirm her answer, and then she praises Elin for doing a good job saying that word. As we can see from this example, through a series of scaffolding and co-construction moves from the teacher in both the content of the story and the Chinese language forms, Elin gets to express her meaning in extended discourse in Chinese. In this process, Elin also gets the opportunity to expand her Chinese

vocabulary and structures and gets to use these linguistic forms in meaning-based contexts.

During teacher-fronted instruction in math, we see another example of this teacher's scaffolding of language and content. In Example 89 below, the whole class is talking about combination and permutation. Prior to this exchange, the teacher has had the children draw on their notebooks three short-sleeve shirts of different colors and three pairs of pants of different colors, and then asks them to figure out how many ways there are to match the short-sleeves with the pairs of pants. While a lot of children get stuck, Elin is among the very few children who figure the problem out, so during teacher-fronted instruction, the teacher invites Elin to go to the front of the classroom to share and talk about her solution, as Example 89 shows. Figure 6 below is a picture of Elin's solution to the problem. It also gives us a bit of context to understand how Elin talks about her solution to the problem when she is invited to the front of the classroom by the teacher.

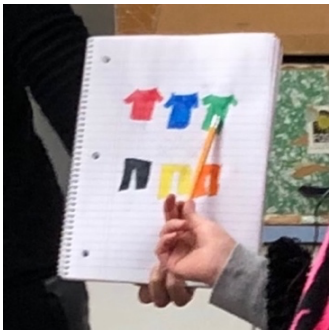


Figure 6
Elin talking about her solution to the combination of permutation problem in Example 89.

Example 89. 3/12/2020. Content: math. Context: Teacher-fronted instruction.

1. Elin	hei se ke yi fang, eh, zai- =
	黑 色可以 放， eh, 在- =
	the black could go with eh- =

2. T = hong yi fu
= 红 衣服
= *the red clothes*

3. Elin hong yi fu, ye ke yi fang- =
红 衣 服,也 可以 放- =
the red cloth, also could go with- =

4. T = lan yi fu
= 蓝 衣服
= *the blue clothes*

5. Elin lan yi fu, ye ke yi fang zai lv se yi fu.
蓝 衣服, 也 可以 放 在 绿 色衣服.
the blue cloth, also could go with the green clothes.

6. T suo yi ni kan hei se ta xie le ji zhong yi fu?
所 以你 看 黑 色她 写 了几 种 衣服？
so you see how many ways does she match the black pants with the clothes?

7. Ss san
三
three

8. T san zhong, na tong yang de shi shen me ya?
三 种, 那 同 样 的是 什 么呀？
three ways, in the same way how about this one?

9. Elin huang se ke yi, eh, hong se de yi fu, ye ke yi lan se, ye ke yi lv se.
黄 色 可以, eh, 红 色的 衣服,也 可以 蓝色, 也 可 以绿色.
yellow could, eh, red clothes, could also go with blue, could also go with green.

As we can see in Example 89, in lines 1 through 5, when Elin starts to share her solution to the problem, she receives a lot of scaffolding from the teacher, and some of her utterances are co-constructed by the teacher. In this process, Elin always repeats the teacher's contributions first and then moves on. The astute reader might have noticed that in line 9 when Elin moves on to talk about how many ways she matches her pairs of

yellow pants with her three short-sleeve shirts, her utterance in Chinese seems to be more fluent, perhaps because she is using the words and phrases that the teacher has offered her earlier in lines 2 and 4.

Rbrul data in Table 6 show that science strongly promotes Elin's use of English compared with Chinese language arts (the reference level) with log-odds of -1.038 ($p = 0.003$) . As shown in Betty's section, one reason that the 45-minute science lesson promotes use of English so strongly could be because, as the very first introductory lessen to a new unit, its primary pedagogical goal is not to elicit the children's Chinese language, but to help them develop a good understanding of key scientific concepts. Please see Example 87 above for Elin's use of English in science.

On/Off Task

Rbrul data in Table 6 show that, using a significance level of 0.05, on-task situations (log-odds = 0.823, $p < 0.0001$) strongly promote Elin's use of Chinese compared with off-task situations during academic time. This pattern is similar to Betty's. When Elin is on task, the conversation topics that she has with her peers are academically related and she tends to speak in Chinese. In Example 90, the children are writing their Chinese assignments in their small groups. In line 1, Elin first asks Zoey in Chinese if she can use Zoey's Chinese textbook, and then in line 3, she further asks Zoey in Chinese if she knows where they can find the phrase "ni zhui wo pao" (*chase each other*) in the textbook.

Example 90. 3/5/2020. Content: Chinese language arts. Context: Producing written assignments.

1. Elin	{wo ke yi-} wo ke yi yong zhe ge ma? {我 可以-} 我 可以 用 这 个 吗？

{can I-} can I use this?
((pointing to Zoey's Chinese textbook))

2. Zoey ke yi.
可以.
sure.

3. Elin ni zhui wo pao shi zai na er?
你 追 我 跑 是 在 哪儿?
where is "chase each other"?

In clear contrast with the on-task situation in Example 90, when Elin is off task, the topics of her conversations with other children tend to be socially related, and she tends to speak in English, as Example 91 below shows. Prior to the exchange in this example, Brian almost said a swear word and made the three young ladies in this small group (Elin, Zoey, and Evelyn) very upset. After Evelyn told on Brian and Brian got reprimanded by the teacher, Zoey still seems to feel shocked about what Brian just said. In lines 1 and 2 in Example 91, Zoey asks Brian in English why he has to say the word. In line 3, Brian defends himself in English, saying that he didn't "say" it. In line 4, Elin argues almost entirely in English with Brian, claiming that he did "say" the word, because he spelled it out!

Example 91. 3/4/2020. Content: Chinese language arts. Context: Producing written assignments.

1. Zoey why did you have to say that word?!

2. Brian, why did you have to say that word?!

3. Brian no, I didn't `say it.

4. Elin **yeah, you did.** {ni-}ni **spell it out**!
yeah, you did. {你-}你 spell it out!
yeah, you did. {you-}you spell it out!

Non-academic Time

Rbrul data in Table 7 show that during non-academic time, activities (i.e. recess, transitions, and snack time) have an impact on Elin's language choice between Chinese and English: recess (the reference level) and transitions (log-odds = - 0.061, $p = 0.799$) promote Chinese, and snack time (log-odds = - 1.319, $p < 0.0001$) promotes English. This pattern is very different from Betty's because none of these activities affected Betty's language use during non-academic time; it is also different from Filip's pattern, where, compared with recess (the reference level), both transitions and snack time promoted his use of English.

Qualitative analysis of Elin's verbal interactions during non-academic time seems to reveal a clear overlap between the effect of activities and the effect of interlocutors. In particular, during recess, Elin is observed to almost always hang out with Filip and his friends, joining the play activities that Filip organizes and leads, and in that space, she almost always speaks Chinese with Filip and his friends (see Examples 61 and 62). On the other hand, during recess, Elin is observed to spend most of her time hanging out with Betty and the other two girls of the friendship cluster, where they speak a lot of English during their secret meetings (please see Example 66). In fact, in comparison to academic activities which are carefully structured by the teacher, the class's non-academic activities are unstructured, because their purpose is to have the children relax and play in their own way or to simply transition to a next activity. In non-academic activities, especially in recess and snack time, the children have a great deal of flexibility to play with and talk to whoever they like, and thus when we study the effect of non-academic activities on children's language use, we are really studying the ways they socialize with

other children, the social roles they play in different peer groups, and how different peer interlocutors affect their use or non-use of Chinese. In other words, it becomes a question about the effect of interlocutors on children's language use during non-academic time. Please see detailed discussion of the interlocutor effects on Elin's language use and her social roles in the previous section, pp. 156-192.

Key Findings for Research Question 2

The second research question examined the effect of tasks and activities on the three focal children's language use during academic and non-academic time. The study findings showed that academic contexts overall promoted the children's use of Chinese whereas non-academic contexts promoted their use of English. During academic time, while the three task dimensions (i.e., task activity, task content, on/off task) did not exert any significant impact on Filip's language use since he almost always spoke Chinese, they exerted statistically significant impact on Betty's and Elin's choice between Chinese and English. In general, teacher-fronted instruction with a lot of inductive teaching promoted more Chinese. However, in small group activities (i.e., producing written assignment, interactive activities), things got a little messier because that was when the children's social roles became pivotal. In other words, the effect of peers as interlocutors got highlighted when children were working together in small groups. Additionally, Chinese language arts, math, and health promoted Chinese while science promoted English. Finally, on-task situations promoted the focal children's use of Chinese whereas off-task situations promoted their use of English.

Summary of the Chapter

This chapter has reported the results of a mixed-method analysis, combining quantitative and qualitative data to show how much Chinese and English were used by three second-grade Chinese immersion children in their school, both individually and as a group, and to investigate the impact of interlocutor and task on the languages they used. The analysis employed rigorous data gathering and analysis techniques using a mixed-method study design, taking a sociolinguistic variationist perspective and assuming that language variation is not entirely random or free but systematic and rule-governed. Rbrul – multiple logistic regression – was used to model factors that promoted each focal child's use of Chinese or English as they carried out classroom tasks and activities with different interlocutors in order to determine which factor(s) consistently contributed to this variation. Qualitative results were also provided to illustrate and shed light on the quantitative results. These findings showed that the three children differed from one another considerably in their overall use of Chinese: one child (Filip) almost always spoke Chinese, and the other two (Betty and Elin) used more English, depending on the contextual variables studied. The contextual factor that most affected all three children's use of either Chinese or English was their interlocutor. The teacher, researcher, and Filip, a student, as interlocutors strongly promoted Betty's and Elin's use of Chinese while other students as interlocutors variably promoted their use of English. Other contextual factors also affected their language use. Academic contexts overall promoted all three students' use of Chinese, while non-academic contexts promoted English. Within academic contexts, the content areas of Chinese language arts and math promoted Chinese. The content areas of science and health, while less well represented in the data

base, seemed to promote English and Chinese respectively. Teacher-fronted activities promoted Chinese for all three students, while writing activities and interactive activities impacted different children's language use differently. When the children were on-task, they spoke significantly more Chinese than in off-task situations. These findings will be discussed in Chapter 5.

Chapter 5

Discussion and Conclusion

This study addressed an understudied area, namely language use in Chinese immersion programs and language use in earlier grades of immersion schools. To that end, the following two research questions were addressed:

1. In a second-grade one-way early total Chinese immersion classroom, how much English L1 and Chinese L2 are used by focal students with various interlocutors they encounter?
2. In a second-grade one-way early total Chinese immersion classroom, how much English L1 and Chinese L2 are used by focal students while carrying out academic compared to non-academic tasks and activities?

This chapter reviews key findings with respect to both research questions. It then takes up the limitations of the study, and suggests future directions for research and pedagogical implications.

The study found that as a group, the three children produced 12,657 utterances in total; 67.6% (8551) were in Chinese, 27.0% (3426) were in English, and 5.4% (680) were in mixed codes. The three children's percentage of Chinese use as a group is comparable to that of Bucknam's Chinese immersion first graders (61%) and of Broner's (2001) Spanish immersion fifth graders (64%). On the whole, the findings of these studies support Blanco-Iglesias, Broner, and Tarone's (1995) observation that children tend to use mostly the immersion language when they are in second and third grade. However, the findings of the present study also suggest that second graders were not totally immersed in Chinese language in that obviously the children do not always use Chinese.

In fact, the language use of the two girls (Betty and Elin) demonstrates a slightly different pattern than the group data reflects: only 52.1% of Betty's utterances and 48.5% of Elin's utterances are in Chinese. The fact that the group percentage of Chinese use is higher is solely because of Filip, who almost always speaks Chinese in the classroom (91.1%). These percentage-based statistics suggest a need to look at factors that might possibly contribute to younger children's use or non-use of the immersion language, and to shed light on possible reasons why Filip is so committed to using Chinese whereas the two girls are not.

Discussion

The Effect of Interlocutor

Who were the interlocutors that affected the three children's language choice? Adults, namely the teacher and the researcher, peers, especially some peers and not others, and *self*, when the children were talking to themselves in private speech.

Talking to an Adult

The study results show that interlocutor as a factor group exerts a statistically significant impact on each of the three children's use of Chinese vs. English during both academic and non-academic time. A commonality that is shared by all three children is that grown-ups (i.e., the homeroom teacher and the researcher) as interlocutors strongly promote their use of Chinese in both academic and non-academic contexts (Tables 2-7). This finding is consistent with findings of other studies (Heitzman, 1994; Tarone & Swain, 1995; Blanco-Iglesias, Broner, & Tarone, 1995; Parker, Heitzman, Fjerstad, Babbs, & Cohen, 1995; Arnau & Bel, 1995; Broner, 2001; Dorner & Layton, 2014; Bucknam, 2016), indicating that adults who consistently speak the immersion language

with the children have a categorically positive effect in promoting students' use of the immersion language irrespective of grade level.

Talking to Peers

Whereas previous studies have suggested a clear dichotomy with respect to the effect of teacher vs. peers as interlocutors, suggesting that teachers tend to promote the use of the immersion language whereas peers tend to promote the use of the L1 (Heitzman, 1994; Parker, Heitzman, Fjerstad, Babbs, & Cohen, 1995; Arnau & Bel, 1995; Dorner & Layton, 2014; Bucknam, 2016; Broner, 2001), the present study does not support such a clear dichotomy. Rather, it offers both quantitative and qualitative evidence to show that the teacher-peer dichotomy may be too simplistic. In fact, the impact of peers as interlocutors appears to be much more complicated than an absolute teacher-peer dichotomy might possibly imply.

Quantitative results shown in Tables 2-7 suggest that (in line with Broner's 2001 results) for each focal child, not every peer interlocutor exerts the same amount of influence on language use. Some peers' influences are significant while others' are not. Second, Rbrul results show that, among the peer interlocutors whose impact is significant, not all strongly promote the use of English. When Filip is the interlocutor, he strongly promotes Betty's and Elin's use of Chinese in both academic and non-academic time. (Broner (2001) reported very similar results; Marvin as interlocutor significantly promoted other children's use of the immersion language (i.e. Spanish), not English). These quantitative results problematize the assumption that children exert a homogeneous effect on each other's language use, and therefore, that their effects can be studied collectively as a group. In fact, because the present study and Broner (2001) create an

individual Rbrul/VARBRUL profile for each individual focal student, they can show the impact of "non-typical" peers like Filip and Marvin. When learners are only studied as a group, the unique impact of such peers can be hidden in the group data, making it impossible for researchers to identify them and study their impact.

Qualitative analysis of the three children's verbal behaviors with peers during both academic and non-academic time suggests that their choice of Chinese vs. English seems to strongly relate to the social roles that each of them plays in the classroom and playground. Qualitative results show that the three children play very distinct roles in the classroom and playground and those roles appear to shift depending on social context. A consistent pattern that emerges from all three data sets is that language shifts and shifts in social roles tend to co-occur. In other words, language appears to shift in accordance with a shift in social role. It appears that, for the three focal students, language and social roles come together as a "package"; certain roles seem to relate to the use of one language and not the other. In the following paragraphs, I will recapitulate the key findings for each of the three children to elaborate and discuss how social roles relate to their use of Chinese vs. English in the classroom.

Qualitative analysis suggests that Filip performs the role of mini-teacher during academic time and of leader of play activities during non-academic time. During academic time, after Filip finishes his assignment, he almost always walks around the classroom with a red pen in his hand, checking other children's assignments, answering their questions, and talking about the problems they have. When he is performing this mini-teacher-helper role, he speaks in Chinese almost exclusively to all the other children. During non-academic time, Filip switches from his teacher role to a role as

organizer and leader of play activities. In this role he sets up the rules, dominates the play, and loudly tells people what to do; surprisingly, he always does this in Chinese. During both academic and non-academic time, in playing these roles, Filip frequently monitors other children's language use, comments on their Chinese language and flags them when he hears them speaking English. These two roles, although they are very context specific, share a lot of commonalities: Filip assumes leadership and power in both roles and both roles tend to exert an obvious impact on and a lot of accommodation from other people. When Filip is in either of these two roles and speaking entirely in Chinese, he does influence the other children's choice of language. Quantitative and qualitative results show that both Betty and Elin always speak Chinese to Filip or in Filip's presence during both academic and non-academic time. The other children who Filip works and plays with seem to do the same thing.

Rbrul results in Tables 4 and 5 show that there are children who significantly promote Filip's use of English during both academic and non-academic time. However, the number of tokens that Filip speaks in English with them is too small to draw any firm conclusions about whether some peers encourage him to use more English than others. Qualitative analysis suggests that when Filip does speak English, he seems to step out of his roles as a mini teacher or a leader. For example, when he joins other children's conversations or activities that are already going on in English, he switches to a little English to accommodate to them; this could be a way to gain entry to those conversations and activities (Examples 37 and 38). Also, when he engages in language play with the other children or when he refers to peer culture, he tends to speak English rather than Chinese (Examples 39 and 40). In addition, when he is talking to someone and their

conversation is not in earshot of the teacher, such as in the hallway or restroom, he also speaks a little English (Example 39). In other words, although Filip mostly performs his roles as a mini Chinese immersion teacher or a leader, there are a few times when he does not, and in those instances, he tends to speak a little English, contrasting sharply with his language use when he plays either of these two roles.

Filip's enactment of his roles as Chinese teacher and leader of play activities is aboveboard and undisguised. However, Betty's role as a leader of student resistance is enacted in a very covert and subtle way. That said, quantitative and qualitative results show that this role significantly promotes her use of English, especially during non-academic time. Betty's role as a covert rebel leader is revealed by Rbrul results showing that her three designated best friends (Elin, Zoey and Stella) strongly promote her use of English during both academic and non-academic time. Qualitative analysis unveils a friendship clique consisted of these four girls, a group where Betty is the leader, devoting some of her energy to mediation among her group members and monitoring and controlling the group's dynamics. As the leader of this girl group, Betty surreptitiously invites her group members to covertly rebel against the teacher and to speak English. For instance, Example 20 shows that when she and Stella are reading a book in the corner of the classroom which is distant from the teacher's desk and Stella suggests that they move to sit on the carpet closer to the teacher's desk, Betty replies in English, saying "no, let's stay here, it's better. Ms. Teng blah blah blah.". Whereas Betty does not always state her resistance against the teacher so clearly and overtly in front of her girl group members, she does physically gather them away from the teacher when they have their meetings. During these meetings, under the leadership of Betty, this little rebel cell tacitly agrees to

speak English, perhaps as a way to claim their membership in this friendship cluster. And as we have seen, both quantitative and qualitative results show that Elin almost always speaks English with Betty and the other two girls in the group when it meets at a distance from the teacher. Betty's impact on the other two clique members' (i.e., Zoey's and Stella's) language use is unquantifiable because neither is a focal participant wearing a lapel mic during data collection, so an Rbrul profile cannot be created for either one to measure Betty's influence. But qualitative data do show that similar to Elin, Zoey and Stella appear to have a strong tendency to speak English to Betty and the others in the clique.

Qualitative analysis further reveals Betty's surreptitious resistance against the teacher's authority when she is on her own. She surreptitiously criticizes the teacher (Example 21), covertly objects the teacher's announcement (Example 22), purposely breaks the school rules (Example 23), makes fun of the adults' family names (Example 23), and sometimes even gets other children in trouble (Examples 24). This resistance might be one reason why Betty is not very committed to speaking Chinese: she does not identify with the teacher or seem to want to sound like the teacher, so when she is leading her girl group, rather than speaking the language the teacher speaks, she speaks HER language – English. In short, the data suggest that for Betty, English appears to be the language of resistance, which she strategically leverages to draw a hard line between the teacher's realm and her realm where she is the leader.

Rbrul results in Tables 2 and 3 do show however that Betty is still like the other children in that when she addresses Filip, she is significantly likely to speak Chinese. This pattern holds during both academic and non-academic time. Why does Filip have

this effect on Betty's use of Chinese? Qualitative analysis suggests that this may be caused by the social roles that the children play in the classroom; language choices seem to be affected by the roles that the children are playing at the moment of speaking. When Betty is talking to Filip, she is no longer playing the role of the leader of her girl group because obviously Filip is neither a girl nor a member of her friendship cluster. We have seen that Filip, as a very assertive boy himself, appears to maintain a leadership role when he talks to other children and this includes Betty. This type of role relationship where Filip is the leader can be seen when Betty is working or playing with him; in such instances, it is always Filip who takes the lead and dominates the conversation, and Betty follows suit when she is with Filip. But it's worth noting that this does not mean that Betty is always submissive or obedient no matter what Filip says; on occasion she does challenge Filip and tries to get her voice heard, but interestingly she rarely wins. This might possibly be one reason why it is Filip who significantly promotes Betty's use of Chinese, and not the other way around; Betty does not significantly promote Filip's use of English. And interestingly, when Betty is interacting with Filip – the teacher's little helper, she is no longer acting on her own to foment resistance, as described in the previous paragraph.

Changes in role relationships caused by change in interlocutors often lead to change in conversation topic; this might also account for why Betty tends to speak Chinese with Filip but switch to English to talk to her best friends even when they are not participating in girl group meetings. Observations suggest that Betty and Filip are not each other's good friends, so when the two work together during academic time, they apparently do not share an interest in non-academic topics that might distract them from

their focus on the academic task. Academic topics are very likely to take place in the L2 in the first place because the L2 input the children receive from the teacher is almost always academically related. This contrasts with the conversations in English that Betty has with her clique members when they are supposed to be studying together in Chinese.

Elin is a situational navigator who charts her pathway between Filip and Betty, the two leaders in the class who each promote other children's use of a different language. A "situational navigator" needs to be very socially aware and strategically adapt his/her behavior (including language behavior) in accordance with the social situation. Elin turns out to be adept at playing this kind of role in the classroom. Rbrul results in Tables 6 and 7 suggest that Filip significantly promotes Elin's use of Chinese during both academic and non-academic time whereas Betty significantly promotes her use of English in both contexts, though especially so during non-academic time. When Elin is just interacting with Filip, during both academic and non-academic time, she pays special attention to what Filip says and does, carefully follows his rules, always speaking the language that Filip speaks – Chinese. While Betty occasionally fights for her own rights when she is playing with Filip though she rarely wins, Elin seems to be more willing to accommodate to Filip's rules and language use. Classroom observation and informal conversations with the homeroom teacher both suggest that Elin seems to like Filip a lot and wants to maintain good terms with him; this could be one reason why Elin almost always speaks Chinese whenever she is talking to him. Another reason may be simply that Filip has this impact on everyone in the class.

When Elin just interacts with Betty, her role shifts to that of a member of Betty's friendship clique. Rbrul results (Tables 6 and 7) show that Elin is significantly likely to

speak English to accommodate to Betty's language of preference. Observations suggest that even though Elin is a member of Betty's friendship cluster, she does not obey the rules that Betty sets up as much as she does when she interacts with Filip; indeed sometimes there are disputes between the two girls. But Elin identifies with Betty (Example 67) and seems to appreciate the values of the girl group (Example 68) – exclusive only to its members. Her personal identification with Betty and her self-positioning as a controlling (and key) member of the friendship clique could be one reason why she switches to English to talk to Betty and the other two girl members – to claim her membership and establish a place in the group.

Elin is very socially aware that the two leaders have different language of preferences and she flexibly uses one language or the other to accommodate to the two peer leaders. However, her social navigation sometimes runs into rocks in cases when she interacts with both leaders at once. Recall that Example 69 shows that when Elin, Betty and Filip work together, Elin's code-switching becomes very pronounced because clearly she does not want to reject either of the two leaders, but she can't please both of them at once. Simply speaking English means she rejects Filip's leadership, and simply using Chinese means she rejects Betty's; clearly, she does not want to do either because in such situations she code switches, in a way that at present does not seem to exhibit any clear pattern.

To sum up, these findings together clearly show that the three children use English L1 and Chinese L2 systematically. Their language choices seem to strongly relate to the social roles that each of them plays in the classroom. These roles shift in response to interlocutors and social contexts and their language use shifts as well, from

one language to the other. The quantitative and qualitative results documenting the impact of peer interlocutors reveal a social web that the three children involve themselves in in the classroom, where complicated social structures of groups and alliances shape the roles that each plays in the classroom with consequences for their use of Chinese or English. These results are in accord with Broner's (2001) observation about fifth grade Spanish immersion students' language use: "the social standing of each child in the classroom may potentially have an effect on the amount of the L2 produced in a particular classroom" (p. 115).

More broadly, the findings of the present study offer strong evidence that immersion children at the second-grade level seem to have already developed a high level of social understanding of their roles and their interlocutors' roles, and that level of social understanding seems to strongly contribute to their systematic and rule-governed language shifts between use of Chinese and English in interacting with different interlocutors in the classroom.

Talking to Self (Private Speech)

The third type of interlocutor that related to the three children's language choice was the *self.* All three children produced a lot of private speech in Chinese during academic time that seemed to serve a variety of functions. All three were observed to murmur to themselves in Chinese to self-regulate their performance particularly when learning Chinese writing. When they were solving math problems, they were also observed to use a lot of Chinese, talking to themselves to help regulate their thinking, although sometimes this private speech occurred in English too. This finding is consistent with findings of Broner (2001) but does not accord with findings of Cohen (1994),

Heitzman (1994) and Parker et al. (1995), who all found that their older Spanish immersion students used their L1 more in private speech when they worked on math. This inconsistency might be caused by the different ages of the study participants, or by methodological limitations of the series of studies conducted by Cohen and his research associates, in which they used English to elicit student verbal reports instead of using the immersion language to do so.

Although the present study does not agree with Cohen (1994), Heitzman (1994) and Parker et al. (1995) in terms of the amount of L1 and L2 children used in their private speech when solving math problems, interestingly, many of the problem-solving processes and language use patterns of Spanish fifth and sixth graders described in Cohen (1994), Heitzman (1994) and Parker et al. (1995) were also used by the younger children in the present study. In Example 53, Elin starts to solve a math problem by reading it out loud to herself in Chinese, but then switches to English to help herself regulate her thinking while she does the calculation. Like the older immersion children, Elin's metacomments were all in English (Examples 52 and 53), indicating that her internal math problem solving might also be done completely in English, as suggested by Cohen (1994), Heitzman (1994) and Parker et al (1995). Similarly, when Betty works on math problems that seem to be difficult for her, she also talks to herself through her first language English, not Chinese (Example 12).

These findings for Betty and Elin seem to suggest that the cognitive load of an academic task could be an underlying factor that affects younger children's use of Chinese vs. English in learning certain areas of content; when children are learning something that seems to be difficult for them, they may talk to themselves in the language

that they know best, which is their first language. This pattern is consistent with the patterns identified by Cohen (1994), Heitzman (1994), Parker et al. (1995), and Swain and Lapkin (1998) in older immersion children's first and second language use in their private speech when working on academic tasks. Lantolf and Thorne (2006) review a series of studies that investigated adult L2 learners mediating themselves through use of the new language (e.g., Lantolf & Frawley, 1984; Frawley & Lantolf, 1985; Appel & Lantolf, 1994; Centeno-Cortés & Jiménez-Jiménez, 2004). One pattern that is identified by Lantolf and Thorne is that the adult L2 learners tend to switch back to their first language to work through academic problems or to regulate themselves through a reasoning process. Lantolf and Thorne (2006) claim that "our thinking processes are fundamentally carried out through the support (i.e. mediation) provided by our first language" (p. 110). The patterns of first and second language use in Betty's and Elin's private speech when they are solving academic problems seem to lend support for Lantolf and Thorne's (2006) claim.

That said, it is interesting that Filip does not seem to follow a similar pattern of first and second language use in his private speech; first, he does not produce many tokens of private speech when he is working on academic tasks, and when he does, his private speech is always in Chinese. Why would this be? One possible reason could be that Filip's Chinese language proficiency is so much higher than the other children's that he is able to use Chinese to do challenging intellectual work. Another possible reason may be that Filip is very committed to speaking Chinese, so much so that he even does so when the interlocutor is himself. A final reason may relate to Filip's standardized test scores of math (fall term, grade 2), which show that he is in the percentile range of 92-95-

97, indicating that he is very competent in math; thus, the math problems in this class may not be very cognitively demanding for him. Filip sometimes seems absent minded during math lessons, perhaps because he has already known the content so he starts to get bored.

Based on the findings of all the three focal children, it is not difficult for us to see that although their use of Chinese and English in this classroom is similar in some ways, in other ways each of them seems to have their own pattern of use of L1 and L2 to mediate their learning. While some children's private speech patterns, like Betty's and Elin's, demonstrate similarities to those documented in early studies like Swain and Lapkin (1998) in that they switch to their first language to mediate their learning, Filip is able to do his academic work through the mediation of L2. So the lesson learned is that as researchers we need to be very careful about how much we generalize our findings, because cases like Filip in this study, and Marvin in Broner (2001) are clearly outliers. In other words, we need to gather more data to come to firm conclusions about immersion children and individual differences in their ability to use the L2 to mediate their learning, as well as possible factors that might affect their success or failure to sustain their mental activity in the L2.

It's worth mentioning that compared with Filip and Elin, Betty produces considerably more private speech in Chinese during academic time. What is different about Betty is that she frequently speaks to herself in Chinese in a very soft voice during Chinese-speaking teacher-fronted instruction, quietly answering the teacher's questions directed to the whole class or to another child, or spontaneously and covertly repeating after the teacher in Chinese for the purpose of rehearsal or for ludic language play. These

forms of private speech in Chinese were not observed nearly as often with Filip and Elin. It's possible that Betty's behavior is related to the fact that her Chinese pronunciation and grammar also appear to be the most accurate among the three children. When Betty covertly talks to herself in Chinese during Chinese-speaking teacher-fronted instruction, it suggests that she is listening attentively to the teacher and so may pay special attention to L2 phonological and grammatical forms. Such a relationship would lend support to Lantolf's (1997) claim that private speech can improve second language learning.

To sum up, the three kinds of interlocutors who majorly influenced the three focal children's language use are adults, namely the teacher and the researcher, peers, especially some and not others, and *self*, when the children are talking to themselves in instances of private speech. The second research question asked about the effect of tasks and activities during academic and non-academic time.

The Effect of Tasks and Activities During Academic and Non-academic Time

The two girls (Betty and Elin) use more Chinese during academic time and more English during non-academic time. Filip, however, almost always speaks Chinese irrespective of academic and non-academic time.

Academic Time

During academic time, the task effect on the three children's use of L1 and L2 was measured in three dimensions: task activity (i.e., teacher-fronted instruction, interactive activities, or producing written assignments), task content (i.e., Chinese language arts, math, science, or health), and on/off task (i.e. on task or off task). Rbrul results (Tables 2 and 6) show that all three dimensions exert statistically significant effects on Betty's and Elin's language use during academic time. However, none of the

three task dimensions exert a significant impact on Filip's use of Chinese vs. English (Table 4) because Filip almost always uses Chinese, regardless of task. In the next section, we discuss how task activity, task content, and task condition (i.e. on or off task) affect Betty's and Elin's use of languages during academic time.

Task Activity

Task activity affects Betty's and Elin's use of the Chinese language in slightly different ways. For Betty, while teacher-fronted instruction promotes more Chinese, interactive activities and producing written assignments significantly promote her use of English (at $p < 0.0001$). However, for Elin, while teacher-fronted instruction promotes the use of Chinese, so does producing written assignments. Only interactive activities promote her use of English.

First of all, why would interactive activities, compared with teacher-fronted instruction, promote use of English for both Betty and Elin? One possible reason could be the different levels of teacher monitoring and scaffolding in these two types of academic activities. During teacher-fronted instruction, all of the children, including Betty and Elin, receive a lot of timely scaffolding from the teacher in both content and the Chinese language, and their language use is also closely monitored by the teacher. However, during interactive activities, it is very challenging for the teacher to monitor and scaffold everybody's language use all at once, because the children carry out the activities in different places of the classroom, and the teacher could only monitor the groups individually by participating in one group at a time. Whenever any of the interactive groups realize that their conversations are not in the earshot of the teacher, they tend to speak English, including Betty and Elin (plus the two girls purposely keep a

distance from the teacher when the opportunity arises to hide their English language use from the teacher).

Previous studies in one-way immersion classrooms have reported similar findings that teacher-fronted instruction and/or teacher-led activities tend to promote more use of the L2 than other academic activities due to the different levels of teacher scaffolding and monitoring (Heitzman, 1994; Parker et al., 1995; Dorner & Layton, 2014; Bucknam, 2016). Another possible reason about why interactive activities promote use of English could be the cognitive load of some of these activities. Data suggest that when the academic tasks are cognitively demanding, both Betty and Elin appear to rely more on English to regulate their thinking. Swain and Lapkin (1998) documented similar observations that French immersion 8th graders switch to English to mediate their learning of French when they seem to encounter language problems. A third possibility could be that some interactive activities tend to be purely physical rather than intellectual which do not require children to productively use the L2, for example the "balancing game" in the science lesson (Examples 72, 73 and 87). Activities like this, although not promoting the use of the second language, are still meaningful to implement in language immersion classrooms because a lot of things happening at school just do not involve language use as much. By doing this kind of activity that involves a lot of body movements, the children are learning important concepts by experiencing it and being aware.

Then what might possibly account for the differences between the two girls' language use in producing written assignments? One possible reason could be that the two girls seem to receive different levels of scaffolding in these writing activities.

Whereas Betty tends to seek help from her group members who couldn't offer her much support either in the content or in the Chinese language (Example 70), Elin usually seeks help from the "experts" – the adults (i.e. the teacher or the researcher) or a couple of other academically competitive children when she has questions (Example 83). Data suggest that Elin appears to get better scaffolding than Betty in producing written assignments, which seems to partially account for her tendency to use Chinese in this particular context. In fact, in such situations where children are either working alone or with peers, whether they get good scaffolding or not turns out to be very personal and idiosyncratic, seemingly relating to who they seek help from when they meet academic problems. Another possible reason could be the different locations of the two girls' small groups in the classroom (see the map of the classroom in the Methodology chapter for reference). Elin's group locates so close to the teacher's desk that her language use and behavior are much more likely to be under the teacher's supervision than children who sit in groups far away from the teacher, for example Betty.

What seems to be clear and consistent for both girls is that the level of teacher monitoring and scaffolding plays an important role in influencing younger immersion children's use or non-use of the L2. A possible pedagogical implication may be that whereas it is always helpful for immersion teachers to use a variety of pedagogical activities to promote content and language learning, constant teacher monitoring and scaffolding when children are carrying out these activities is essential to promote their use of the second language. Given the fact that it seems impossible for the teacher to monitor and scaffold every child's language use all at once especially when they are carrying out activities in different places in the classroom, it might be helpful to have

children like Filip join each of these groups, since the study results also show that such "assistant teachers" may exert very similar pressure promoting other children's use of the immersion language and give other children scaffolding in both content and language when needed.

Task Content

Betty and Elin demonstrate very similar patterns in terms of the effect of task content on their use of Chinese (Tables 2 and 6). This is true for all content areas for which data were collected for both girls, i.e., Chinese language arts, math, and science.

The content areas of math and Chinese language arts exert very similar impact on Betty's and Elin's use of Chinese. This finding does not accord with previous findings that language arts tends to promote more use of L2 than math in immersion classrooms (Arnau & Bel, 1995; Broner, 2001; Bucknam, 2016). Then why do Chinese language arts and math promote Betty's and Elin's use of Chinese to a very similar degree? One possible reason could be that the teacher seems to offer at least the same amount of scaffolding, or perhaps even more scaffolding in math than in Chinese language arts. For instance, the teacher designs a variety of interactive activities to engage the children in hands-on experience with complicated math concepts and creates opportunities for them to use Chinese in a meaningful way. When she is teaching math, she draws all kinds of pictures and asks the children to do a lot of reasoning in Chinese. It seems that the teacher's pedagogical approach to teaching math encourages children's participation and creative use of the Chinese language. However, this approach to teaching math could be very unique to her and not characteristic of all teachers of math. The teachers in Arnau &

Bel (1995), Broner (2001), and Bucknam (2016) may use different approaches during math instruction that do not encourage children's use of the immersion language as much.

The present study is a partial replication of Broner (2001), so the differences in the extent to which math promotes children's use of the immersion language between the two studies could also be methodological – the present study and Broner (2001) use different statistical tools to measure the relationship between content and language use. Broner (2001) used VARBRUL, whereas the present study used Rbrul, a newer tool that was developed recently by Johnson (2009). VARBRUL sets sum coding as default, which means that the factor weight, in the old parlance, of each content area is compared to the grand mean of the entire data set. Different from VARBRUL, Rbrul allows the flexibility to choose between sum coding and treatment coding, and if treatment coding is chosen (as in the present study), one content area will serve as a reference level and the log-odds values of all the other content areas will be compared to the reference level whose log-odds is 0. A t-test can be further pursued with *R* to report the p-values to see whether the differences between a particular content area and the reference level are significant or not significant. So if Broner's (2001) reference level is the grand mean, then the author may not have access to information about whether the differences between content areas, for example the differences between math and Spanish language arts, are significant or not.

With Chinese language arts as reference, science significantly promotes Betty's and Elin's use of English (Tables 2 and 6), and health significantly promotes Betty's use of Chinese (Table 2). Classroom observations suggest that the level of teacher monitoring and the pedagogical goals of the lessons seem to relate to the children's use or non-use of

Chinese in these subject areas. In health, close teacher monitoring promotes use of Chinese; in science, productive use of the immersion language is simply not a requirement when the learning mostly involves watching, feeling and experiencing. But it's worth noting that these results need to be interpreted with caution because both content areas are less well represented in the data base.

These findings indicate that "content" is not just discipline information, but it is a package of the discipline information plus how it gets transmitted through pedagogical activities. Since teachers have their unique styles of teaching and transmitting knowledge, so the package would vary from one teacher to another and from one classroom to another. In this particular classroom with this particular teacher and group of children, it seems that it is the activity that is used in pedagogy that clearly influences the children's use of Chinese and English. For example, the "balancing game" seems to strongly promote children's use of English and the activities the teacher uses to teach math (e.g. interactive activities where children get hands-on experience with new math concepts, reasoning a solution to a math problem using Chinese, etc.) promote the use of Chinese. Across content areas, activities with consistent teacher monitoring and scaffolding strongly promote Chinese use than activities without (See previous section on discussion of task activity). In other words, it seems to be less clear what influence the subject matter has on children's language use, because task activity appears to have a very strong impact just in its own rights at this grade level.

On/Off Task

Finally, this study shows that on-task situations strongly promote Betty's and Elin's use of Chinese as compared to off-task situations (Tables 3 and 7). The same

tendency occurs in Filip's Rbrul results too (Table 5), although in his case it is not statistically significant, for reasons explained earlier. These findings are consistent with Broner's (2001) findings with Spanish immersion fifth graders and Bucknam's (2016) findings with Chinese immersion first graders. When the children in this study are off-task, their conversations tend to cover a wide range of topics, a majority of which are socially oriented and non-academically related and these tend to occur in English. This finding, together with the finding that the children tend to use English during non-academic time overall, as compared to academic time, supports Tarone and Swain's (1995) hypothesis that a diglossic situation may develop in language immersion classrooms. The present study offers evidence that diglossia may happen much earlier in children's language immersion experiences than some scholars originally expected (Blanco-Iglesias, Broner, & Tarone, 1995).

Non-academic Time

During non-academic time, different patterns of task activity affect each of the three children's language use (see Tables 3, 5 and 7). Betty's Rbrul results (Table 3) show that none of the three non-academic activities (i.e. recess, snack time, transitions) play an important role in conditioning her use of Chinese or English during non-academic time. The only factor that exerts an impact on Betty's language use during non-academic time is interlocutor. For both Filip and Elin, task activity as a factor group does account for their language use during non-academic time, although each particular activity has different log-odds and different significance levels compared with the reference, recess (see Tables 5 and 7). However, the effects of the non-academic activities on Elin's and Filip's language use need to be interpreted with caution, because as I have mentioned in

the Findings chapter, there seems to be an overlap between the effects of interlocutors and the effects of the activities, given the fact that the non-academic activities are unstructured and the children are given a lot of flexibility to do whatever they want.

Limitations

The present study calculated the amount of L1 and L2 that was used by three young children and carefully documented how contextual factors affected their use or non-use of the immersion language. There are at least four limitations of the study. First, since it is a case study investigating three English-speaking second graders' language use in a one-way early total Chinese immersion program, the study results can't be generalized to other student populations or types of immersion programs. Second, the three children's interactions were not video-recorded because it was not feasible to set up a video camera in the classroom for an extended period of time each day. Thus, some contextual information may have been lost due to lack of access to video-recorded data. Third, since non-academic activities are less structured than academic activities and the borders from one another can't be firmly and reliably drawn, the efforts to categorize task activities in academic time does not seem to apply very well to categorize non-academic activities during non-academic time. Fourth, this was not a longitudinal study, so it could not account for shifting dynamics and patterns over time.

Future Research

Future studies that stem from this study should look specifically at what kind of Chinese interlanguage the three children produced at this early stage of acquisition. While the three children appeared to be able to produce some Chinese utterances very accurately and in a native-like manner, there seemed to be many Chinese utterances that

were non-native like and sounded like the students were filling an English syntactic and intonational frame with Chinese words. This phenomenon is interesting; why might some utterances/patterns/features be very native-like while others were not? Could it be because English discourse and Chinese discourse converge in some instances so it's the same structure but just with different linguistic codes? Or is it because the children memorize some expressions as chunks, leading to more native-like production? Do the same linguistic patterns produced by the children also appear in the teacher's input? To what extent do usage-based linguistic theories explain young immersion children's L2 learning? The answers to these questions will shed light on the L2 learning mechanisms of young children learning Chinese in an immersion program from alternative perspectives.

Another issue that needs to be explored further is why Chinese language arts and math promote children's use of the immersion language to very similar extent. Due to the limit in time and space, I was not able to conduct a more in-depth analysis to figure out why the data turn out the way they are. A more detailed analysis is needed to shed light on this issue. Additionally, the fact that we have earlier research with older kids (e.g. Cohen,1994; Heitzman, 1994; Parker, et al., 1995; Broner, 2001) showing more English use in math is a clear sign that we need more data to figure out how different pedagogies and approaches to teach math affect children's use or non-use of the immersion language. In the present study, I only gathered data in one second-grade Chinese immersion classroom from one teacher; we need more data from other immersion classrooms of either the same or different grade levels teaching not only Chinese but also other immersion languages to further inform our understanding on this issue.

Since the present study is only able to look at the three different roles that the focal students played in the classroom, a third issue that needs to be further explored is other roles that may be common in the classroom and their impact on children's language use. For example, the class clown Wayne is not a focal student of the present study, so a question to ask may be: what is the impact of a class clown on other children's use or non-use of the immersion language? My classroom observation suggests that Wayne seems to almost always speak English himself and appears to get other children to speak English. As a class clown, why does Wayne always speak English? To make other children laugh? To impress other children? To get the teacher's attention? Questions like these cannot be answered without research to study children like Wayne by systematically documenting their social behavior and language use in the classroom. Opportunities given, it would also be interesting to go back to the classroom one or two years from now to record the same three children, Betty, Filip and Elin, to see if their roles ever change and how that might affect their own and other children's use of the immersion language. Additionally, forthcoming research might do a deeper analysis into the construct of social roles than the present study allows. Alternative constructs in future analysis might be "voice" (Bakhtin, 1981), language play (Bakhtin, 1981), and stance (Du Bois, 2007; Jaffe, 2009; Kiesling, 2015; 2018). These constructs could advance the analysis beyond that permitted by the construct of role, and provide a fuller picture of children's language use in an immersion classroom.

Conclusion

This study sought to add new information on language choice in Chinese immersion programs as well as on language use in early grades of any immersion

program. As a group, three second graders in a one-way early total Chinese immersion program used more L2 than L1 in the classroom. However, given the considerable amount of L1 use of the three children as a group and individually, it cannot be said that these second graders were totally immersed in Chinese language. All three children almost always used Chinese with the teacher and the researcher. Variation analysis established that both interlocutor and task could account for variation in two children's use of L2 and L1, but one child, Filip, almost always used the immersion language with little variation related to interlocutor or task. Variation analysis cannot effectively explain why such an individual difference occurred. Qualitative analysis suggests that the different social roles that each child plays in the classroom do seem to account for such individual differences in the degree to which different children's language use was impacted by interlocutor and task. Filip's assumption of a leadership role involving identification with the teacher appeared to strongly promote his L2 use, while apparent resistance to the teacher's authority seemed to promote Betty's L1 use. In other words, substantial individual differences among younger immersion children in their use of L1 or L2 may be related to the social roles they played in the classroom. Where students assumed leadership roles, in either emulating or resisting the teacher, they also exerted strong influences on the language behaviors of children who did not adopt roles as leaders. Such "followers" tended to accommodate to the language preferences of peer leaders they interacted with from moment to moment.

For two of the children, non-academic time and off-task situations during academic time tended to promote more use of the L1. Chinese language arts and math lessons promoted students' use of L2. Activities with a high level of teacher monitoring

and scaffolding tended to promote more L2 use than other activities, indicating the necessity of teacher monitoring and scaffolding in promote children's use of the immersion language.

While these younger immersion children did use their developing L2 as a cognitive tool to help them solve math problems, the extent to which they relied on the L2 as a cognitive tool seemed to be largely constrained by factors such as the cognitive load of the math problem, each child's math competence, and amount of scaffolding in Chinese provided by the teacher and peers.

Private speech using the L2 in the form of covert repetition may have promoted L2 learning of the participants in that these forms of private speech in the L2 suggested that they were listening attentively and paying attention to L2 forms.

Language use patterns and influential factors identified in these second graders were similar to diglossic patterns identified in fifth graders (Broner, 2001), suggesting that older immersion children's diglossic patterns might be formed in earlier grades than previously believed.

Contributions and Implications

The present study contributes to the language immersion literature by establishing how much L1 and L2 are used by second-grade Chinese immersion children based on a large amount of naturally occurring data systematically gathered in the classroom. By second grade, Chinese immersion children are able to stick to using Chinese for two thirds of the time overall. Blanco-Iglesias, Broner and Tarone's (1995) more informal observations of second graders in a one-way Spanish immersion program are fairly close to the finding of the present study, in that children maintain the immersion language

fairly well at this grade level. Researchers and teachers might be disappointed that the children are clearly not using the immersion language all the time. But notice that the children are not in third grade yet, where an increase in their use of the immersion language could happen, given Blanco-Iglesias et al.'s (1995) observations in the Spanish immersion context. Of course, since Chinese and English are unrelated languages, this may pose potentially challenges for children's use and learning of the immersion language as compared with that in a Spanish immersion class.

The present study also contributes to our understanding of immersion classrooms by establishing through use of inferential statistics (i.e. multiple logistic regression) contextual factors that promote or inhibit younger children's use of the immersion language. Findings show that some variables do cause the children to use more Chinese than others. Interlocutor is an important variable. While the children always use Chinese to talk to Chinese-speaking adults, qualitative analysis brought in for the first time the insight that the roles the children play may explain why they use one or the other language with certain peers. The study also showed that teacher-fronted activities with a lot of inductive teaching (i.e., when the teacher is not just lecturing) produces student use of significantly more Chinese. However, in small group activities, children's social roles enhance the effect of peer interlocutors. These findings suggest that if teachers want to promote children's use of the immersion language, they may want to employ inductive teaching approaches, asking the children a variety of questions, and offering timely scaffolding, even during teacher-fronted instruction but also when circulating among small groups in the classroom. When teachers assign children to small groups, they should pay attention to the roles that the children are playing and try to strategically alter

group membership to maximize the children's use of the immersion language. For example, teachers in the class studied probably would want to get Betty out of her girl group and put her in a group with Filip, because he is the only one strong enough to interrupt her subversion and get her to use Chinese. In other words, teachers may want to observe carefully the dynamics of small groups and children's role relationships with each other and teachers themselves, and think about why certain children cause everybody around them to speak English and what they can do to stop that. Since children exert mutual impact on each other, teachers might strategically use class leaders, such as Filip, to get the class to use more immersion language.

The study's mixed-method design allows the researcher to take into account the human element in her understanding of social interaction, language learning, and language teaching. At first glance, the present study simply looked at language use. But as the qualitative analysis delved deeper and deeper and started to touch upon reasons behind the quantitative results, the focus of investigation became these children, as human beings, who have emotions, personal preferences and unique temperaments, and who use language as a tool to sustain human functions in the social community where they belong. Qualitative analysis forced questions about the learners such as: Who are the they? What are their personalities? What are their relationships with other people in the classroom? Why do they like hanging out with certain children but not others? What are they doing here and there? Why do they behave, react, and say things the way they do in certain contexts? And finally, when they say things in these contexts and situations, what language do they use and why? The astute reader might notice that the language question comes at the very last in this list of questions. Why? Because when our genuine curiosity

centers on human nature, language use becomes a by-product. In other words, we can't really answer the language question without first answering the human question. This research experience implies that language learning and use are biologically embodied and socially embedded. Researchers working in language education will not get as much from their research if they view and study language as a construct that is detached from the human body and separated from the social community where it is learned and used by human beings.

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Appendix 1

Recording Sessions with Lapel Mics

Day 1	**Date:**	**Wednesday, March 4, 2020**
	Time: Total Time: Activity:	8:30-9:00 30 minutes Morning reading: doing Math problems (*Math Box 8.1-8.4,* p. 7-10)
	Time: Total Time: Activity:	9:00 -10:20 80 minutes Math (1) Teacher-fronted instruction on *Math Box 8.1-8.4,* p. 7-13 (2) fractions
	Time: Total Time: Activity:	10：20-10：55 35 minutes Snack time
	Time: Total Time: Activity:	10：55-11：35 40 minutes Chinese Language Arts
	Time: Total Time: Activity:	12：20 - 1：10 50 minutes Chinese Language Arts Recess
	Time: Total Time: Activity:	2：00-2：25 25 minutes Recess
	Time: Total Time: Activity:	2：25-3：3：15 50 minutes Chinese Language Arts: *Celebrating the Birthday*
Day 2	**Date:**	**Thursday, March 5, 2020**
	Time: Total Time: Activity:	8：50 – 9：30 40 minutes Morning reading: 1. writing Chinese characters

		2. *Math Box 8.1 – 8.4* p. 15, 20, 21, 22
	Time: Total Time: Activity:	9:30-10:30 55 minutes Math: *Math Box 8.1 – 8.4* p. 15, 20, 21, 22
	Time: Total Time: Activity:	10:30-11:00 30 minutes Snack time
	Time: Total Time: Activity:	11:00-11:40 40 minutes Chinese Language Arts: *Celebrating the Birthday*
	Time: Total Time: Activity:	12:20-1:10 40 minutes Chinese Language Arts: *Celebrating the Birthday*
	Time: Total Time: Activity:	1: 10- 1:40 40 minutes recess
	Time: Total Time: Activity:	1:40 – 2:00 20 minutes Chinese Language Arts: *the Happy Prince*
Day 3	**Date:**	**Monday, March 9, 2020**
	Time: Total Time: Activity:	8:30-9:00 30 minutes Morning reading: 1. writing Chinese characters 2. math: multiplication
	Time: Total Time: Activity:	9:00-10:00 60 minutes Chinese Language Arts: *Which pet do you want to have?*
	Time: Total Time: Activity:	10:00-10:20 20 minutes Snack time
	Time: Total Time: Activity:	10：45-11：40 55 minutes Math: Teacher-fronted instruction (*Math box* 8.1-8.4, p. 17, 23, 24, 25)

	Time: Total Time: Activity:	12:25-1:25 60 minutes Math: fractions Recess
	Time: Total Time: Activity:	1:25-2：00 45 minutes Chinese Language Arts: *Which pet do you want to have?*
Day 4	**Date:**	**Tuesday, March 10, 2020**
	Time: Total Time: Activity:	8：40-9：00 20 minutes Chinese Language Arts: prepare for test
	Time: Total Time: Activity:	9:00-9:40 40 minutes Chinese unit test (monitored by a substitute Chinese immersion teacher)
	Time: Total Time: Activity:	9:40-10:00 20 minutes Recess (supervised by a substitute Chinese immersion teacher)
	Time: Total Time: Activity:	10:00-10:30 30 minutes Snack time (supervised by a substitute Chinese immersion teacher)
	Time: Total Time: Activity:	10:30-11:40 70 minutes Math: *Math Box 8.5-8.8* p. 1-7 (taught by a substitute Chinese immersion teacher)
	Time: Total Time: Activity:	12：25-1：10 45 minutes Math: *Math Box* 8.5-8.8 p. 1-7 Recess
	Time: Total Time: Activity:	1:15-2:00 45 minutes Health: how to deal with an emergency
Day 5	**Date:**	**Wednesday, March 11, 2020**
	Time:	8:30-9:15

	Total Time:	45 minutes
	Activity:	Morning reading: doing math problems (*Math box 8.5-8.8*, p. 18-22)
	Time:	9:15-9:45
	Total Time:	30 minutes
	Activity:	Coding
	Time:	9:45-11:05
	Total Time:	80 minutes
	Activity:	Math: *Math box 8.5-8.8*, p. 18-22
	Time:	11:05-11:40
	Total Time:	35 minutes
	Activity:	Snack time
	Time:	12：25-1:10
	Total Time:	45 minutes
	Activity:	Science: Balancing
	Time:	1:10 – 1:30
	Total Time:	20 minutes
	Activity:	Recess
	Time:	1：30-2：00
	Total Time:	30 minutes
	Activity:	Chinese Language Arts: *Love Island*
Day 6	**Date:**	**Thursday, March 12, 2020**
	Time:	8:30- 9:30
	Total Time:	60 minutes
	Activity:	1. Morning reading: practice writing Chinese characters and pinyin 2. Recess
	Time:	9:30-10:30
	Total Time:	60 minutes
	Activity:	Math: 1. combination and permutation 2. comparison of fractions
	Time:	10：30-11：15
	Total Time:	45 minutes
	Activity:	Snack time

Time:	11：15-12：00
Total time:	45 minutes
Activity:	Math: comparison of fractions
Time:	12：25-12：45
Total time:	20 minutes
Activity:	Recess
Time:	12：45-12：55
Total time:	10 minutes
Activity:	Science: watch *Mystery Science: how does germ get into our body?*
Time:	12：55-2：00
Total time:	65 minutes
Activity:	Chinese Language Arts: *Love Island*

Appendix 2

Transcription Conventions (Adapted from Broner, 2001)

,	Comma indicates a falling intonation.
.	Period mark indicates a final intonation.
↑	Up arrow indicates a rising intonation.
?	Question mark indicates questions.
!	Exclamation mark indicates an emphatic tone.
(0.5)	The number in brackets indicates a time gap in tenths of a second.
`	Backquote mark indicates speaker emphasis.
/ /	Parallel virgules indicate approximate phonetic transcription.
可^	Circumflex indicates a glottal stop on an character.
我 -	Dash indicates cut off or unfinished utterance.
° °	Single degree signs indicate the talk they encompass is spoken at a lower volume than usual, but not a whisper.
°° °°	Double degree signs indicate the talk they encompass is spoken in a very soft voice or whispered speech.
°°° °°°	Triple degree signs indicate the talk they encompass is a soft whisper. Consonant sounds clearly heard, with vowel sounds difficult to discern.
CAPITAL	Words in capitals indicate a section of speech is noticeably louder than that surrounding it.
Sound::::	Colons indicate that the speaker has stretched the preceding sound or letter. The more colons the greater the extent of the stretching.
[[	Square brackets between adjacent lines of concurrent speech indicate overlap.
=	The ‘equals’ sign indicates ‘latching’ between utterances.

@	The “at” sign indicates the speech is in microphone range. (@T means that the teacher is known to be in microphone range but not necessarily at the children’s group.)
(…)	Parentheses with ellipsis inside indicate the presence of an unclear fragment on the tape.
(guess)	The words within a single bracket indicate the transcriber’s best guess at an unclear utterance.
{ }	Curly brackets indicate false starts, repetitions, self-corrections, and sounding fillers showing dysfluency (e.g. um, uh).
“ ”	Quotation marks indicate direct quotation.
(( ))	A description enclosed in a double bracket indicates a non-verbal activity.
*	An asterisk indicates a noticeable grammar error.
Italics	Italics indicates English translation.
Underlined italics	Underlined italics indicates English transliteration.
< >	Angle brackets indicate parts of speech in Chinese.